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# **The Application of Audiometric Data Base Analysis to Selected Air Force Bases**

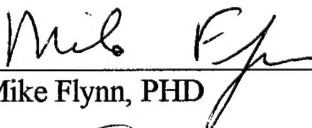
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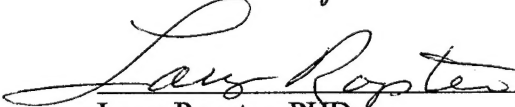
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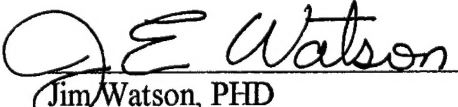
A technical report submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Master of Science in Environmental Engineering in the Department of Environmental Sciences and Engineering, School of Public Health.

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## Abstract

This paper focuses on using Audiometric Data Base Analysis (ADBA) to evaluate the effectiveness of the hearing conservation program (HCP) at eight Air Force Bases. The primary goal is to evaluate the effectiveness of the HCP for all eight bases combined. The secondary goal was determining which groups of personnel are experiencing the most variability in their hearing threshold levels (HTLs).

The ADBA results revealed that the total group exhibited a program that was between marginal and unacceptable. Breaking the total group's audiometric data into smaller groups did not reveal a significantly different variability by group with the exception of gender. Females had significantly less variability in their mean HTLs when compared to males.

The standard deviation of differences of HTLs measure did not give similar results to the other measures. The use of the standard deviation of difference of HTLs measure is not recommended for use under the present guidelines.

An overall distribution of TWAs (time weighted averages) for the total group showed a fairly normal distribution with the 50th percentile at 85 dBA (A frequency-weighted sound pressure level). The 10th percentile is 77 dBA and 90th percentile is 94 dBA for the total population.

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## **Introduction**

Currently, noise exposure and audiometric data are collected and maintained for all personnel in the United States Air Force (USAF) HCP. The audiometric data are maintained in a central database. The noise exposure data are kept in separate databases at each Air Force Base (AFB). Individual's noise exposure and audiometric data are maintained in their medical records and evaluated but no group analysis is routinely done. The goal of this study was to merge the sound survey data from each database with the audiometric data and do an overall quality assurance review of the HCPs included in the study.

The data for the study came from several sources. The audiometric data (70,777 records on 14,166 individuals) came from the Hearing Conservation Data Registry (HCDR) in the Occupational and Environmental Health Directorate, Armstrong Laboratory, Brooks AFB, TX. Noise exposure data came from databases at each base. The medium size bases use a database called BEEKEEPER to store noise exposure data. The large bases use a database called PHOENIX to store the noise exposure data. In addition, the required personnel data were obtained from the Military Personnel Center, Randolph AFB TX.

The primary method for evaluating the HCPs is the ADBA protocol defined in the Draft American National Standard Institute (ANSI) Standard S12.13-1991 - Evaluating the Effectiveness of Hearing Conservation Programs. ADBA evaluates variability in HTLs using three different methods.<sup>4</sup> The results can be used to classify the overall HCP as acceptable, marginal or unacceptable.

Each ADBA procedure is discussed and used to evaluate the USAF data studied. First, an overall quality evaluation is carried out for the total group. Then the individual data groups are evaluated. Finally, the findings for the total and subset data bases are presented and a comparison of the findings across data bases are discussed.

Since the standard is a draft publication for use and comment, this is an excellent time to evaluate the USAF programs with the different methods and see how they compare and provide comments to the ANSI working group.

### **Background**

Prevention of occupational hearing loss is the primary goal of a HCP. However to prevent hearing loss, HCP personnel need to be able to detect developing Noise Induced Permanent Threshold Shifts (NIPTS) before significant hearing loss occurs. Audiometric Data Base Analysis (ADBA) offers the potential for detecting problems in the HCP (such as noise induced hearing loss) quickly before significant hearing loss can occur.

ADBA has several other advantages. It provides data that can be used to develop simple charts and graphs that may be used in education sessions for presenting to supervisors and employees the effectiveness of the HCP in their department, providing motivation for the HCP. ADBA has also been used by HCP personnel to compare the effectiveness of different hearing protective devices and to demonstrate to management the effectiveness of, or lack of, dollars spent on the HCP.<sup>11</sup>

The only valid objective indication of whether a HCP is succeeding in preventing occupational hearing loss is audiometric results for the noise-exposed employees. Review of selected individual audiometric records provides information on the hearing changes for

the individuals. However, this review process does not give an overall picture of how well a group of workers are being protected.<sup>11</sup>

The ADBA procedures are based on various ways of measuring year-to-year audiometric variability. A properly protected noise-exposed population should not have any more variability in their hearing threshold levels than for a population not exposed to significant occupational noise exposure assuming all other sources of variability are controlled.<sup>4</sup> For a more detailed discussion of ADBA please refer to previous publications in the literature. 5-10,12

The sources of audiometric variability include normal fluctuations in the responsiveness of individuals, inconsistencies in equipment calibration, testing methods used and true threshold changes due to temporary or permanent hearing loss.<sup>11</sup> With personnel moving between bases on a regular schedule every three to five years, these variables may be hard to control and assess. Therefore, the movement of personnel may be a major source of variability in HTLs.

### **USAF HCP**

The USAF HCP is administered by Aerospace Medicine. A three pronged approach is used. Bioenvironmental Engineering conducts sound level meter and noise dosimetry surveys and evaluates noise controls. Military Public Health conducts supervisor training and issues hearing protective devices. Physical Exams provide audiometric exams. Each group is part of Aerospace Medicine which coordinates these efforts through the occupational medicine working group.<sup>1,2</sup>

The USAF does not follow the requirements of the Occupational Safety and Health Administration (OSHA) noise standard. It uses different criteria. To describe the USAF HCP criteria, a few definitions are needed. First, the criterion level is the 8 hour equivalent that results in a 100% noise dose measurement. Next, exchange rate defines the increase or decrease in sound level for a corresponding halving or doubling of exposure time. The exchange rate is also called the trading ratio or doubling rate. Finally,  $L_{eq,T}$  is the equivalent continuous A frequency-weighted sound level over a time T. If T is 8 hours,  $L_{eq,8}$  becomes the time-weighted average, or TWA.

The USAF program presently uses a criterion level of 85 dBA and a 3 dB (decibel) exchange rate. Individuals are allowed noise exposures unprotected less than 85 dBA. USAF members are placed on the HCP if the TWA equals or exceeds 85 dBA and hearing protection is required. Previously, the USAF used a criterion level of 84 dBA and a 4 dB exchange rate. The use of the current criterion level and exchange rate started in December 1993.

### **Characteristics of the Studied Air Force Bases**

Eight AFBs were selected for this study, two large bases and six medium size bases. The two large bases were Kelly AFB (San Antonio, TX) and Robins AFB (Warner-Robins, GA). Both bases are primarily air logistic centers and perform depo level maintenance on aircraft. The six medium size bases were Langley AFB (Hampton VA), Shaw AFB (Sumter, SC), Seymour-Johnson AFB (Goldsboro, NC), Pope AFB (Fayetteville, NC), Charleston AFB (Charleston, SC) and Randolph AFB (Universal City, TX). Langley, Shaw, Seymour-Johnson and Pope AFBs are primarily fighter bases. Charleston AFB is primarily a transport base. Randolph AFB is primarily a pilot training base.

## **Group Descriptive Statistics**

To assess the HCP programs, only personnel with at least four sequential audiograms were used. This limited the total group size considerably (14,166 to 6655 individuals). The last four sequential tests are renumbered so the most recent test is test 4 and the next most recent test is test 3, etc.

The audiometric data are divided into several different groups for comparison purposes. First, a total group is formulated that includes personnel from all eight AFBs. Next, the total group is split into military and civilian groups and into male and female groups. Additionally, the total group is split into groups based on ethnic classifications. Last, the total group is broken down further into individual AFB data bases. Appendix C lists group descriptive statistics for each group. Statistics listed include the number of USAF personnel included in each group and the average age and average service length for each test.

## **ADBA Criteria**

In applying the ADBA procedures defined by the Draft ANSI S12.13-1991 standard, the data should "ideally" (but not an absolute requirement) meet certain requirements. The audiograms should have been given approximately yearly with the maximum interval between tests less than eighteen months. The population data base should be restricted to the same subjects over the period of analysis. A minimum number of audiograms is suggested for each subject of the population and the population should be representative of all employees, with a minimum of 30 people per analysis group. The audiometric data should be collected during the work shift, so temporary threshold shifts as well as developing permanent threshold shifts can be detected by the ADBA procedures. Finally

the data should be checked for possible contamination (includes re-test results, obviously major shifts in HTLs across test frequencies, etc.) before analysis.<sup>4</sup>

The ANSI standard presents three measures of variability in hearing threshold levels for use when comparing sequential audiograms. The three measures are:

1. Percent Worse Sequential (%W<sub>S</sub>): percent of population showing a 15 dB shift toward worse hearing in either ear at any test frequency (0.5 to 6 kilohertz, kHz) in sequential test comparisons.

2. Percent Better or Worse Sequential (%BW<sub>S</sub>): percent of population showing a 15 dB shift toward better or worse hearing in either ear at any test frequency (0.5 to 6 kHz) in sequential test comparisons.

3. Standard Deviation of Differences in Hearing Threshold Levels (S<sub>X</sub>): is calculated using the differences averaged across ears,  $\bar{X}$ , at the audiometric test frequencies of 0.5 to 6 kHz between sequential hearing thresholds of  $N$  individuals. The standard deviation,  $S_X$ , is calculated as follows:

$$S_x = \sqrt{\frac{\sum X^2 - \frac{(\sum X)^2}{N}}{N-1}},$$

where  $X$  is the difference between sequentially averaged hearing thresholds, and  $N$  is the number of individuals.

Criterion ranges for evaluating the results from applying the three ADBA measures are given in appendix A, tables 1 and 2. The criteria utilized depends on which set of

sequential audiograms are being compared, the true first four (1-2, 2-3 and 3-4) for a population or later audiograms (4-5, 5-6, 6-7, 7-8, etc.). Table 1 is for the %W<sub>S</sub> and %BW<sub>S</sub> measures. Table 2 is for the S<sub>X</sub> measure at individual test frequencies.<sup>4</sup>

## Results

Appendix A, table 3 shows the results of applying the ADBA procedures to the last four tests for the total group and sub-groups using the %W<sub>S</sub> and %BW<sub>S</sub> measures. Also indicated in the table is the 95% confidence intervals for each measure calculated.

Appendix A, table 4 presents the results for the S<sub>X</sub> measure for the total group. Appendix A, table 5 shows the mean HTLs vs. mean age and frequency for each group.

The data for appendix A, tables 3, 4 and 5 are taken from the ADBA outputs. The ADBA outputs were generated using the PC-Hearval<sup>13</sup> Audiometric Data Base Analysis Program for use with PC-compatible computers. Appendix D presents the first page output of the CMPALL.EXE program that generates baseline and sequential test comparison results. The different overall comparison criteria are shown. The data discussed herein (%W<sub>S</sub> and %BW<sub>S</sub>) corresponds to category 8, which is shown blocked in.

Appendix E presents, pages E-1 to E-3, the shift results for all eight AFBs for the test comparisons 1-2, 2-3 and 3-4. As an example, on page E-1, the shift data (in 5 dB increments for the left, right and combined ear HTLs) is shown. In addition, the mean and standard deviation of the shift data is shown. Finally, at the bottom of the page is the summed shift data by category. As noted earlier, category 8 presents the %W<sub>S</sub> and %BW<sub>S</sub> data presented herein.

### Total Group and Individual AFB Groups

Appendix B, figure 1 presents the %W<sub>s</sub> data for the total group and each individual AFB. Looking at figure 1, the HCP ratings are generally in the marginal range. The total group's %W<sub>s</sub> measure varied from 23 to 27%. Most of the data are overlapping and it is hard to distinguish between the individual groups. The exception is the Seymour-Johnson AFB data. The data from Seymour-Johnson exhibited the smallest group size (n=80) for comparison and the highest variability in HTLs (%W<sub>s</sub> from 20 to 45%).

Appendix B, figure 2 presents the %BW<sub>s</sub> data for total group and each individual AFB. Most of these data points are in the lower unacceptable to marginal range. The total group has a %BW<sub>s</sub> measure ranging from 40 to 43%. Once again the Seymour-Johnson AFB data are generally higher than the rest of the data (41 to 54%). Charleston and Shaw AFBs also have higher %BW<sub>s</sub> measures than the total group (45 to 48 % and 45 to 50%). The rest of the bases have similar %BW<sub>s</sub> measures to the total group. Based on the %W<sub>s</sub> and %BW<sub>s</sub> measures, the total group and most of the individual AFB group findings are in the upper marginal to lower unacceptable range. Appendix E contains the shift results from the total group of all eight AFBs. Appendix F presents the shift results for each individual AFB.

### S<sub>x</sub> Measure

Appendix A, table 4 presents the results for the S<sub>x</sub> measure for the total group. Using the S<sub>x</sub> measure, shown in appendix B, figure 3, the total group has an acceptable HCP (all frequencies have lower standard deviations than listed in appendix A, table 2). The individual AFB groups have similar S<sub>x</sub> measures as the total group. The failure of the S<sub>x</sub> measure to identify unacceptable HCPs has been noted by the ANSI S12.13 working group, and the standard deviation of differences ADBA measure was therefore dropped. Therefore, the S<sub>x</sub> findings will not be discussed further.



### Civilian vs. Military Groups

Appendix B, figures 4 and 5 are plots of the %W<sub>s</sub> and %BW<sub>s</sub> measures for the total group split into civilian and military groups. These groups have large populations, so their 95% CIs are fairly small. Both groups present similar variability results with the %W<sub>s</sub> in the 22 to 28% range for civilians and 23 to 25% range for military. The %BW<sub>s</sub> findings are also similar, with ranges of 41 to 42% and 37 to 44% for the civilian and military groups. Since the civilian group is much less mobile than the military group this would suggest that movement between bases may not be a major source of the variability observed in the USAF HCP. Appendix G presents the shift results for the military and civilian groups.

### Gender Groups

Appendix B, figures 6 and 7 are plots of the %W<sub>s</sub> and %BW<sub>s</sub> measures for the total group separated by gender. The female group is considerably smaller than the male group ( 365 vs. 6207 individuals). In general, the female group has less variability in its mean HTLs (%W<sub>s</sub> of 18 to 19 % vs. 24 to 27% and %BW<sub>s</sub> of 34 to 35% vs. 40 to 45%). The 95% CIs for both groups do not overlap. The female group is primarily in the marginal range and the male group overlaps both the marginal and unacceptable range. The shift results for the male and female groups are located in appendix H.

### Ethnic Groups

Appendix B, figures 8 and 9 separates the total group into different ethnic groups. Only three ethnic groups had large enough numbers to be considered, blacks, hispanics and whites. All the groups exhibit very similar variability with the %W<sub>s</sub> and %BW<sub>s</sub> measures matching the total group's measures. The %W<sub>s</sub> measure varied from 24 to 26 % for whites, 21 to 24% for blacks and 20 to 27% for hispanics. The %BW<sub>s</sub> measure varied

from 39 to 45% for whites, 39 to 41% for blacks and 40 to 41% for hispanics. Appendix I presents the shift results for each ethnic group.

#### Mean HTLs vs. Audiometric Test Frequency

Another way of looking at the data analyzed is presented in appendix B, figures 10-25. In figure 10, the mean HTLs are plotted vs. test frequency for the total group for the population's last four tests. This type of plot presents one view of the data. It provides information with respect to the population's hearing characteristics over time by audiometric test frequency. Similarly in figures 11-18, the mean HTLs are plotted vs. test frequency for the population of each individual AFB. In Fig 19-25, the mean HTLs are plotted vs. test frequency for remaining groups (civilian vs. military, gender and ethnic).

#### Mean HTLs vs. the Population's Mean Age

In figures 26-41, the same data base is plotted as mean HTLs vs. mean age by audiometric test frequency for the total group and each sub-group. This type of data configuration provides useful information including: the mean time between tests, the average age of the population at each test and possible calibration errors (significant shifting in HTLs between tests at one or more test frequencies).

#### Noise Exposure Distributions

The audiometric data obtained from the HCDR exhibited a noise exposure value field. A closer inspection of the values for this noise exposure data found it to be unreliable. Some bases had no information entered and others had the same value for all personnel.

Therefore, instead of trying to use this questionable data, noise exposure data were directly collected from databases at each AFB studied. Appendix B, figure 42 presents a cumulative distribution plot of the TWA data for the total group representing all eight AFBs. TWAs were determined by work area. Each work area has at least one eight-hour

TWA and some have as many as sixty-five. Over seven hundred work areas are included in this overall distribution. The median of the total group's cumulative TWA distribution was approximately 85 dBA. The 10th percentile is 77 dBA and 90th percentile is 94 dBA. It is noted that this distribution is based primarily on the estimated TWAs that were determined using the previous 4 dB exchange rate.

Similar plots of the distribution of TWAs for each base are in appendix B, figures 43-50. Charleston, Kelly, Robins and Seymour-Johnson AFBs have medians similar to the total group in the 84-85 dBA range. Pope AFB's median is slightly lower at 82 dBA. The remaining AFBs, Shaw, Langley and Randolph, have higher medians of 87, 88 and 90 dBA respectively.

### **Conclusions and Recommendations**

This paper focused on using ADBA to evaluate the HCPs at eight Air Force Bases. The ADBA results for the total data base studied classify the USAF HCP as unacceptable to marginal. Breaking the overall data into individual AFB groups did not reveal a group with significantly different variability from the total group. The exception being that females within data bases exhibit significantly less variability in their HTLs as compared to males.

An overall distribution of TWAs for the total group shows a fairly normal distribution with the 50th percentile at 85 dBA. The 10th percentile is 77 dBA and 90th percentile is 94 dBA for the total population.

The standard deviation of differences ANSI S12.13 measure failed to provide similar results to those found using the %W<sub>s</sub> and %BW<sub>s</sub> measures. Therefore the use of the

standard deviation of difference of HTLs measure is not recommended in attempting to evaluate the effectiveness of HCPs in general.

Since ADBA findings yielded a program classification of unacceptable to marginal, it is recommended that the source or sources of the identified high variability in USAF audiometric data be investigated further.

## References

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### List of Abbreviations

ADBA	- Audiometric Data Base Analysis
HCP	- Hearing Conservation Program
HTL	- Hearing Threshold Level
dBA	- A Frequency-Weighted Sound Pressure Level
USAF	- United States Air Force
AFB	- Air Force Base
HCDR	- Hearing Conservation Data Registry
ANSI	- American National Standards Institute
OSHA	- Occupational Safety and Health Administration
dB	- Decibel
Leq,T	- Equivalent Continuous A-Weighted Sound Level Over a Time Period T
NIPTS	- Noise Induced Permanent Threshold Shifts
%W <sub>s</sub>	- Percent Worse Sequential
%BW <sub>s</sub>	- Percent Better or Worse Sequential
S <sub>x</sub>	- Standard Deviation of Differences in Hearing Threshold Levels
N	- Number of Individuals
CI	- Confidence Interval
kHz	- Kilohertz
X	- Mean Difference Between Sequentially Averaged Hearing Thresholds at Selected Audiometric Test Frequencies
TWA	- Time Weighted Average, dBA

## Appendix A: Tables

<u>Page</u>	<u>Table</u>
A-1	1. Recommended Criterion Ranges for Rating HCP Effectiveness Using %W <sub>s</sub> and %BW <sub>s</sub>
A-2	2. Recommended Criterion Ranges for Rating HCP Effectiveness Using the Standard Deviation of Differences in HTLs
A-3	3. %W <sub>s</sub> and %BW <sub>s</sub> and 95% Confidence Intervals for Each Group
A-4	4. Standard Deviation of Differences Findings for the Overall Group
A-5	5. Mean HTLs (dB) vs Mean Age and Audiometric Test Frequency for Each Group Listed

TABLE 1. Recommended Criterion Ranges for Rating HCP Effectiveness Using %Ws and %BW

HCP Rating	Sequential comparisons	Sequential comparisons	
	of first four tests	of later tests	
	(1-2,2-3, and 3-4)	(5-6, 6-7, 7-8, etc)	
	%Ws	%Ws	%BW
Acceptable	<20	<17	<26
Marginal	20 to 30	17 to 27	26 to 40
Unacceptable	>30	>27	>40

%Ws - Percent Worse sequential

%BW - Percent Better or Worse sequential



TABLE 2. Recommended Criterion Ranges for Rating HCP Effectiveness Using the Standard Deviation of Differences in HTLs

Test Frequency kHz	HCP Rating	Sequential comparisons of first four tests (1-2,2-3, and 3-4)	Sequential comparisons of later tests (5-6, 6-7, 7-8, etc)
0.5	Acceptable	<6	<5
1	Marginal	6 to 7	5 to 7
or 2	Unacceptable	>7	>7
3	Acceptable	<7	<6
	Marginal	7 to 10	6 to 8
	Unacceptable	>10	>8
4	Acceptable	<7	<7
	Marginal	7 to 10	7 to 10
	Unacceptable	>10	>10
6	Acceptable	<9	<8
	Marginal	9 to 12	8 to 11.5
	Unacceptable	>12	>11.5

Table 3: %Ws and %BW's and 95% Confidence Intervals for Each Group

Group		Test	%Ws	+/- CI	%BW's	+/- CI
Total	(n=6655)	1-2	26.5	1.1	43.0	1.2
		2-3	25.0	1.0	41.9	1.2
		3-4	23.2	1.0	40.0	1.2
Bases	Charleston (n=962)	1-2	26.6	2.8	47.8	3.2
		2-3	24.3	2.7	45.3	3.1
		3-4	34.5	3.0	47.9	3.2
	Kelly (n=3052)	1-2	27.3	1.6	40.3	1.7
		2-3	25.8	1.6	40.6	1.7
		3-4	20.0	1.4	39.4	1.7
	Langley (n=359)	1-2	20.1	4.1	40.9	5.1
		2-3	18.4	4.0	35.9	5.0
		3-4	25.1	4.5	38.7	5.0
	Pope (n=743)	1-2	26.5	3.2	45.8	3.6
		2-3	22.9	3.0	43.5	3.6
		3-4	16.6	2.7	31.5	3.3
	Randolph (n=286)	1-2	32.2	5.4	45.8	5.8
		2-3	23.8	4.9	41.3	5.7
		3-4	26.6	5.1	38.1	5.6
	Robins (n=689)	1-2	25.8	3.3	40.6	3.7
		2-3	26.7	3.3	40.6	3.7
		3-4	18.3	2.9	34.3	3.5
	Seymour-Johnson (n=80)	1-2	20.0	8.8	41.3	10.8
		2-3	45.0	10.9	52.5	10.9
		3-4	32.5	10.3	53.8	10.9
	Shaw (n=481)	1-2	25.2	3.9	49.9	4.5
		2-3	24.7	3.9	45.3	4.4
		3-4	33.5	4.2	48.6	4.5
Sex	Male (n=6207)	1-2	27.1	1.1	43.7	1.2
		2-3	25.4	1.1	42.4	1.2
		3-4	23.5	1.1	40.2	1.2
	Female (n=365)	1-2	17.8	3.9	34.0	4.9
		2-3	18.9	4.0	34.5	4.9
		3-4	17.8	3.9	34.0	4.9
	Civilian (n=2859)	1-2	27.9	1.6	41.3	1.8
		2-3	26.6	1.6	41.5	1.8
		3-4	21.5	1.5	41.1	1.8
	Military (n=3029)	1-2	25.4	1.6	43.7	1.8
		2-3	23.7	1.5	41.9	1.8
		3-4	23.2	1.5	37.4	1.7
Race	White (n=3252)	1-2	26.3	1.5	44.9	1.7
		2-3	24.5	1.5	42.6	1.7
		3-4	24.3	1.5	39.1	1.7
	Black (n=506)	1-2	21.7	3.6	40.1	4.3
		2-3	23.9	3.7	40.9	4.3
		3-4	21.1	3.6	39.1	4.3
	Hispanic (n=2038)	1-2	27.0	1.9	39.6	2.1
		2-3	26.4	1.9	40.7	2.1
		3-4	19.7	1.7	39.6	2.1

Table 4: Standard Deviation of Differences Findings for the Overall Group

	Standard Deviation of Differences in HTLs					
Overall (n=6655)	Test Frequencies, kHz					
	0.5	1.0	2.0	3.0	4.0	6.0
tests 1-2	4.4	3.5	3.5	4.4	5.1	7.2
tests 2-3	4.3	3.5	3.6	4.3	5.0	7.1
tests 3-4	4.0	3.3	3.5	4.3	4.9	7.1

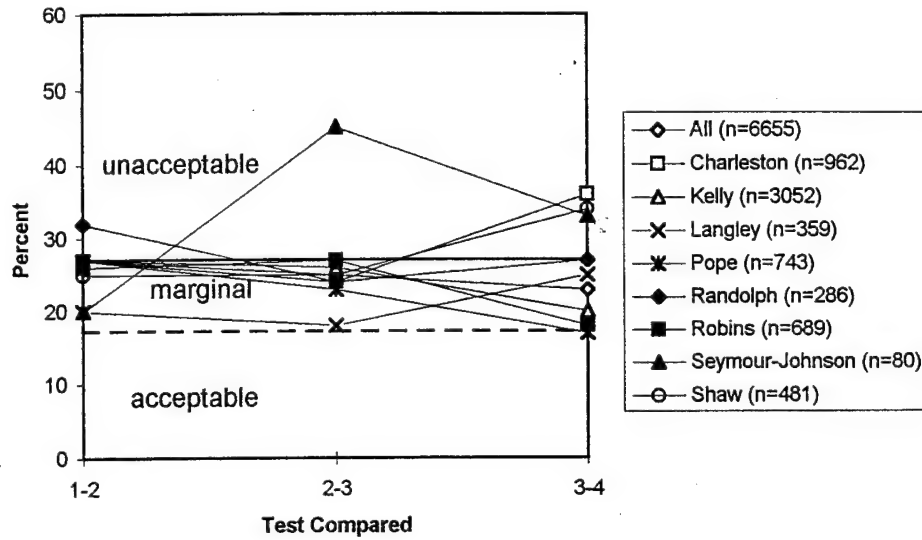
Table 5: Mean HTLs (dB) vs Mean Age and Audiometric Test Frequency for Each Group Listed

All (n=6655) Frequency	Age (y)				Randolph (n=286) Frequency	Age (y)			
	34.7	35.9	37.2	38.3		32.4	33.7	35	36.7
0.5 kHz	8.31	8.49	8.61	8.24	0.5 kHz	6.05	5.77	5.45	6.68
1 kHz	6.65	6.84	7.10	6.64	1 kHz	4.46	4.83	4.81	5.05
2 kHz	7.39	7.62	8.04	7.87	2 kHz	4.95	5.59	5.98	6.11
3 kHz	13.05	13.91	14.65	14.56	3 kHz	8.68	10.06	10.20	11.80
4 kHz	16.78	17.86	18.92	19.04	4 kHz	11.78	13.19	14.19	16.02
6 kHz	21.04	21.72	21.96	22.22	6 kHz	16.08	18.05	18.85	20.12
Charleston (n=962) Frequency	Age (y)				Robins (n=689) Frequency	Age (y)			
	31	32.1	33.5	34.6		29.5	31	32.4	33.7
0.5 kHz	6.71	6.57	6.40	6.59	0.5 kHz	6.51	6.82	7.55	6.91
1 kHz	4.95	4.88	5.01	5.46	1 kHz	4.75	5.41	5.61	4.97
2 kHz	5.35	5.37	5.64	6.08	2 kHz	4.90	5.45	5.74	5.41
3 kHz	9.42	9.99	11.27	11.07	3 kHz	8.07	8.88	9.58	9.58
4 kHz	12.31	12.71	13.46	14.15	4 kHz	11.24	12.53	13.50	13.48
6 kHz	18.87	18.34	17.48	20.23	6 kHz	14.35	15.76	16.69	16.61
Kelly (n=3052) Frequency	Age (y)				Shaw (n=481) Frequency	Age (y)			
	38.9	40.2	41.5	42.6		35.6	36.5	37.4	38.3
0.5 kHz	10.29	10.85	11.32	10.45	0.5 kHz	6.56	6.20	6.15	6.46
1 kHz	8.75	9.07	9.67	8.62	1 kHz	4.92	4.94	5.25	5.49
2 kHz	10.11	10.46	11.05	10.56	2 kHz	5.56	5.44	5.75	5.91
3 kHz	18.17	19.44	20.07	19.86	3 kHz	10.14	10.47	11.64	10.98
4 kHz	22.98	24.57	25.87	25.63	4 kHz	13.78	14.49	15.30	14.97
6 kHz	25.82	27.14	27.92	27.14	6 kHz	21.20	20.30	19.18	21.99
Langley (n=359) Frequency	Age (y)				Seymour-Johnson (n=80) Frequency	Age (y)			
	28.9	30.4	31.7	32.9		38.1	39.2	40.5	41.5
0.5 kHz	8.28	8.01	7.74	7.99	0.5 kHz	4.91	4.31	4.94	5.66
1 kHz	6.07	5.64	5.36	5.22	1 kHz	4.56	3.91	4.03	4.12
2 kHz	5.93	5.90	5.59	5.77	2 kHz	3.91	3.88	4.84	5.34
3 kHz	8.41	8.26	7.91	8.38	3 kHz	9.59	9.03	10.53	10.91
4 kHz	11.41	11.37	11.29	11.83	4 kHz	13.22	13.09	14.78	15.66
6 kHz	14.97	14.58	13.79	13.52	6 kHz	17.62	16.66	21.81	22.88
Pope (n=743) Frequency	Age (y)				Hispanic (n=2038) Frequency	Age (y)			
	29.4	30.6	31.8	32.9		39.3	40.6	41.8	43.0
0.5 kHz	6.35	6.09	4.90	4.75	0.5 kHz	10.90	11.43	11.99	11.08
1 kHz	4.47	4.39	3.93	3.93	1 kHz	9.33	9.62	10.29	9.18
2 kHz	4.34	4.38	4.77	4.70	2 kHz	10.99	11.34	11.96	11.43
3 kHz	7.55	7.91	8.50	8.70	3 kHz	19.67	20.91	21.54	21.19
4 kHz	9.28	9.60	10.79	11.14	4 kHz	24.31	25.78	27.07	26.71
6 kHz	15.56	15.70	15.21	14.88	6 kHz	26.51	27.67	28.58	27.66
White (n=3252) Frequency	Age (y)				Black (n=506) Frequency	Age (y)			
	31.8	33.1	34.3	35.5		33.4	34.8	36.3	37.4
0.5 kHz	7.24	7.33	7.19	7.04	0.5 kHz	7.40	7.36	7.45	6.79
1 kHz	5.37	5.51	5.62	5.39	1 kHz	6.23	6.37	6.40	6.03
2 kHz	5.70	5.93	6.26	6.22	2 kHz	6.55	6.51	7.03	6.75
3 kHz	10.21	10.92	11.75	11.86	3 kHz	8.70	9.03	9.62	9.49
4 kHz	13.68	14.55	15.58	16.01	4 kHz	10.55	11.46	12.15	11.93
6 kHz	18.88	19.46	19.40	20.08	6 kHz	14.96	15.22	15.60	15.65
Civilian (n=2859) Frequency	Age (y)				Military (n=3029) Frequency	Age (y)			
	40.0	41.3	42.5	43.7		29.4	30.7	32.0	33.2
0.5 kHz	10.68	11.22	11.69	10.85	0.5 kHz	6.51	6.44	6.23	6.15
1 kHz	9.09	9.44	10.10	9.02	1 kHz	4.70	4.74	4.70	4.67
2 kHz	10.71	11.07	11.73	11.25	2 kHz	4.72	4.87	5.11	5.13
3 kHz	19.32	20.52	21.36	21.06	3 kHz	7.76	8.31	8.96	9.10
4 kHz	24.33	25.84	27.25	26.95	4 kHz	10.26	10.94	11.76	12.23
6 kHz	27.28	28.51	29.33	28.67	6 kHz	15.46	15.77	15.61	16.37
Male (n=6207) Frequency	Age (y)				Female (n=365) Frequency	Age (y)			
	34.6	35.9	37.1	38.3		35.0	36.3	37.6	38.7
0.5 kHz	8.26	8.45	8.55	8.19	0.5 kHz	9.23	8.94	9.31	8.77
1 kHz	6.65	6.87	7.13	6.68	1 kHz	6.70	6.22	6.56	6.15
2 kHz	7.43	7.70	8.12	7.96	2 kHz	6.72	6.32	6.76	6.32
3 kHz	13.39	14.32	15.07	15.02	3 kHz	8.11	7.85	8.46	7.74
4 kHz	17.32	18.43	19.52	19.67	4 kHz	8.88	9.29	9.94	9.67
6 kHz	21.40	22.11	22.36	22.64	6 kHz	15.93	15.83	16.02	15.70

## Appendix B: Figures

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B-18	42. All Eight Bases - Distribution of Leq's
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B-21	45. Langley AFB - Distribution of Leq's
B-22	46. Pope AFB - Distribution of Leq's
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B-24	48. Robins AFB - Distribution of Leq's
B-25	49. Seymour-Johnson AFB - Distribution of Leq's
B-26	50. Shaw AFB - Distribution of Leq's

**Figure 1: %Ws for the Total Group and Each Base**



**Figure 2: %BWs for the Total Group and Each Base**

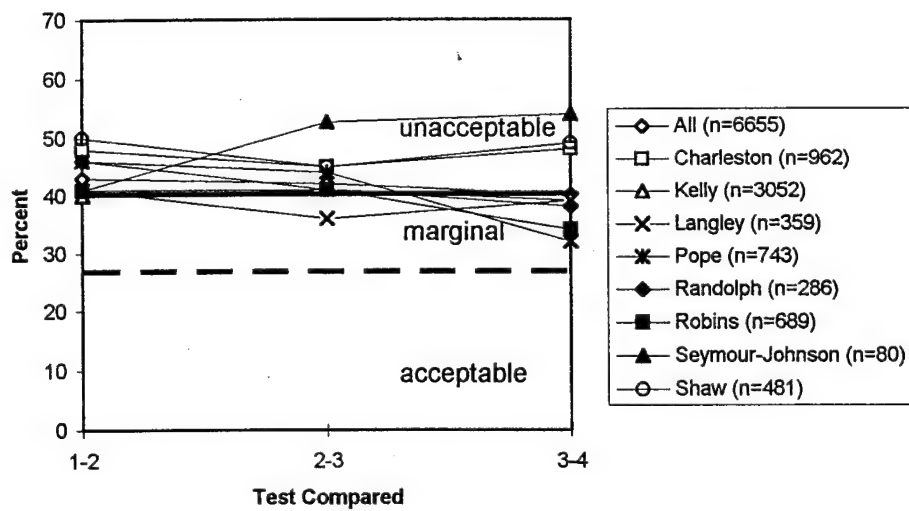
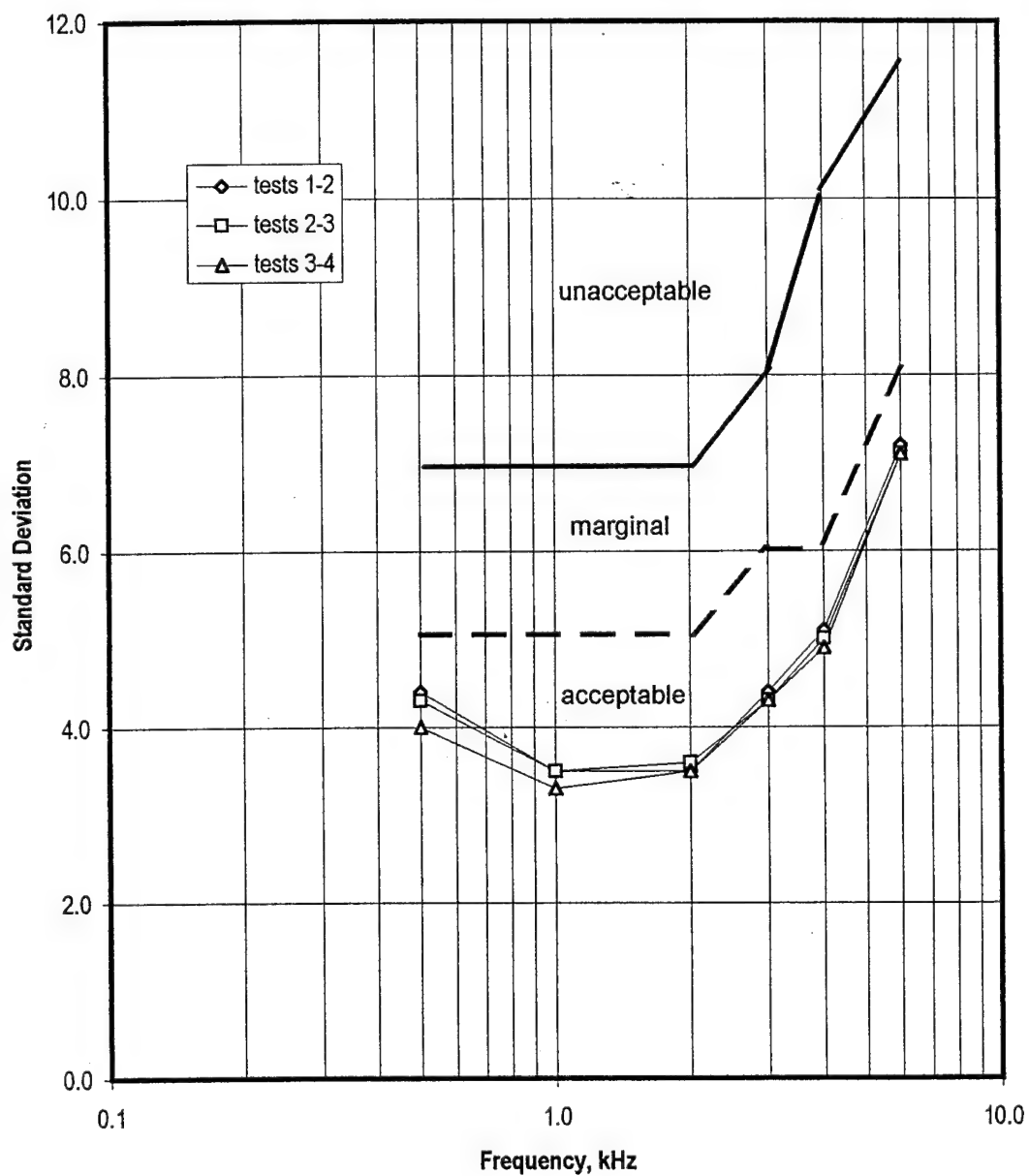
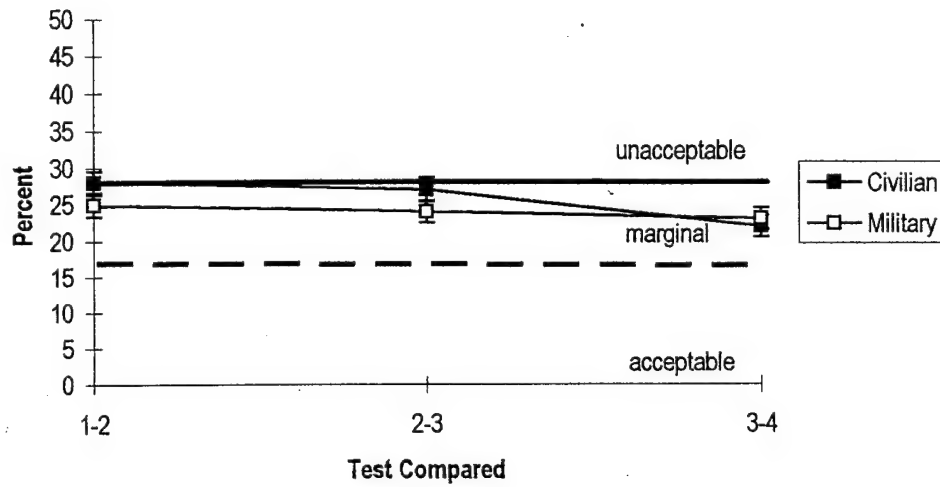


Figure 3: Standard Deviation of Differences in HTLs for All Eight Bases (n=6655)



**Figure 4: %Ws for Civilians vs. Military**



**Figure 5: %BWs for Civilians vs. Military**

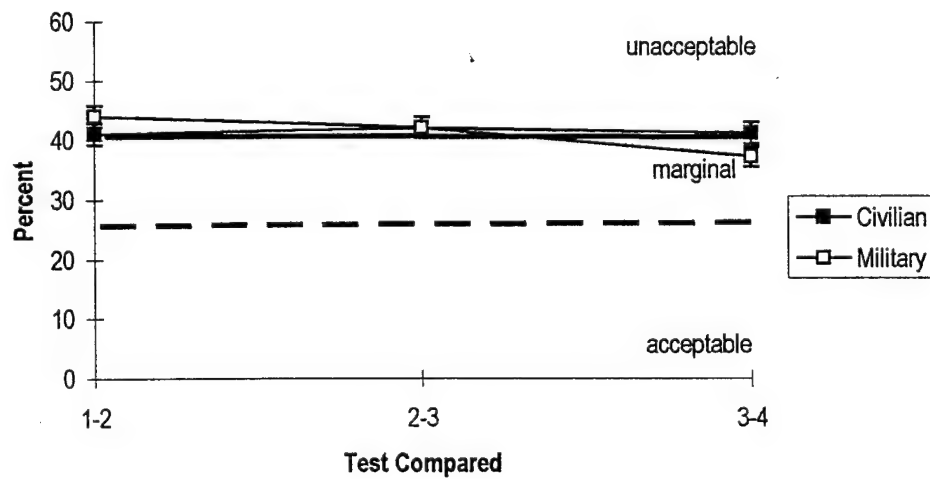




Figure 6: %Ws for Males vs. Females

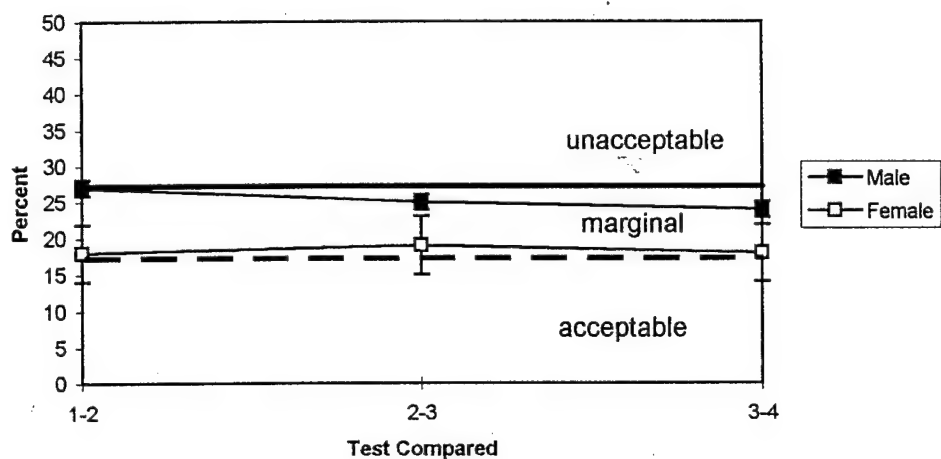


Figure 7: %BWs for Males vs. Females

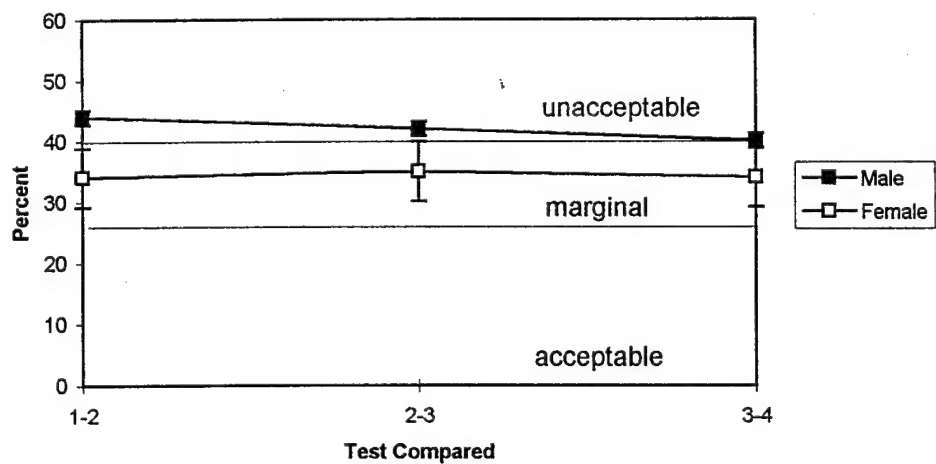


Figure 8: %Ws for Ethnic Groups

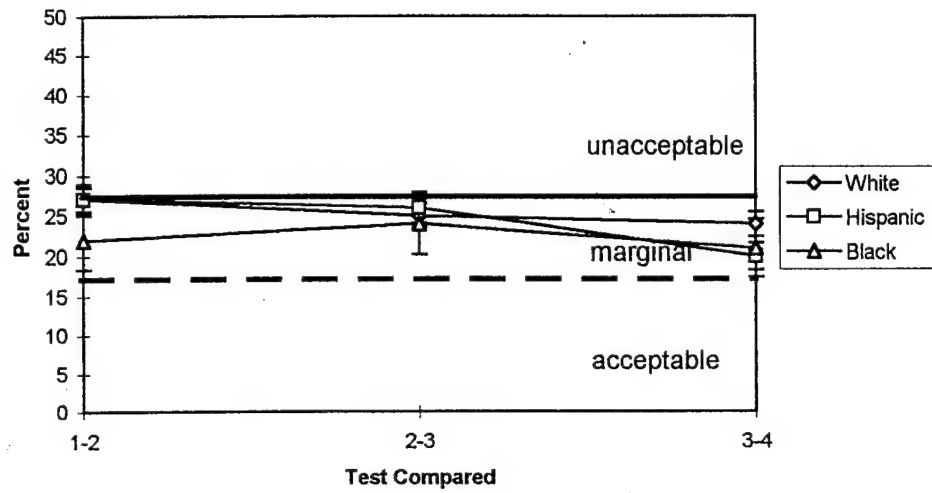
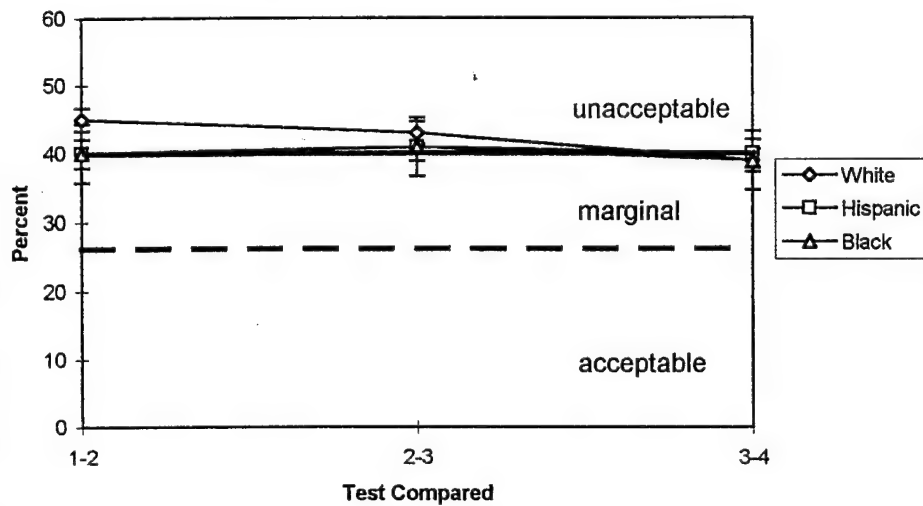
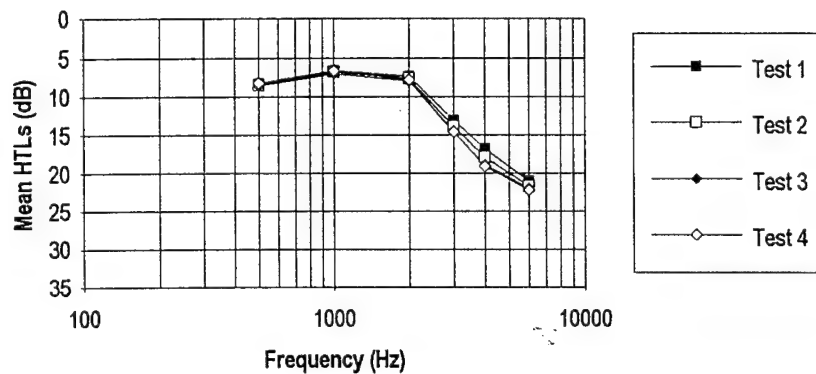


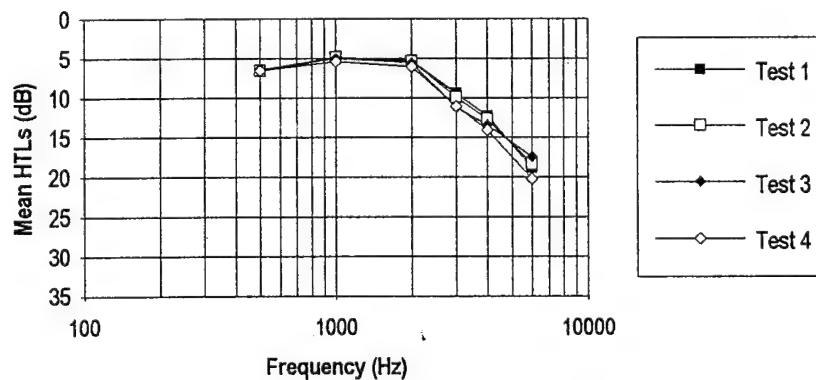
Figure 9: %BWs for Ethnic Groups



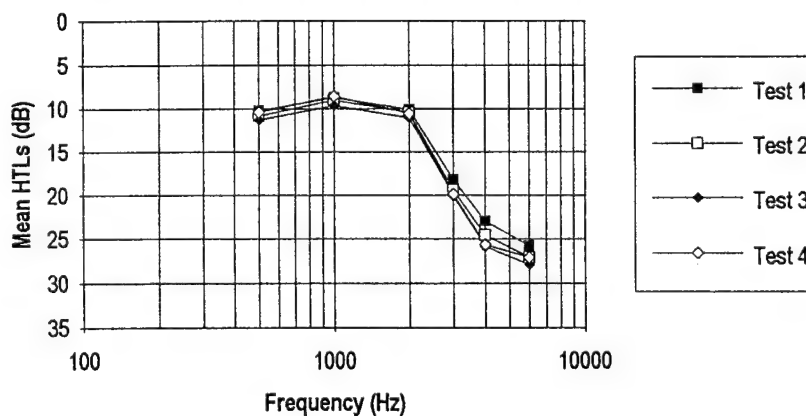
**Figure 10: Mean HTLs for Each Test - All 8 Bases  
(n=6655)**



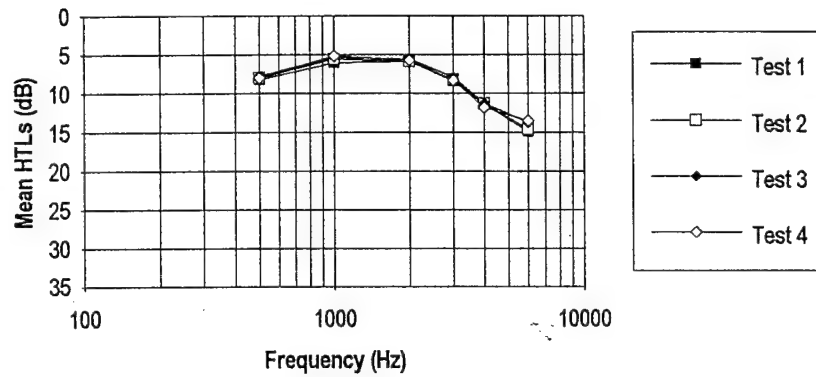
**Figure 11: Mean HTLs for Each Test - Charleston AFB  
(n=962)**



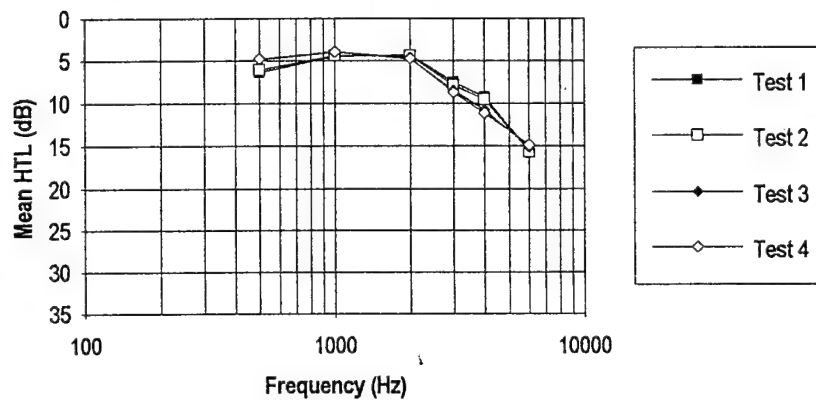
**Figure 12: Mean HTLs for Each Test - Kelly AFB (n=3052)**



**Figure 13: Mean HTLs for Each Test - Langley AFB  
(n=359)**



**Figure 14: Mean HTLs for Each Test - Pope AFB (n=743)**



**Figure 15: Mean HTLs for Each Test - Randolph AFB  
(n=286)**

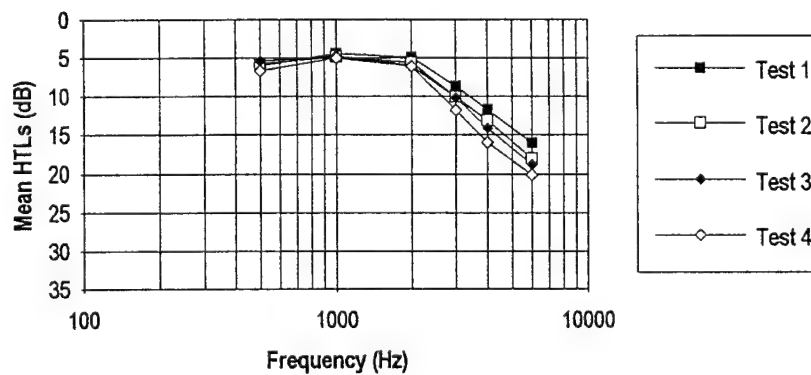


Figure 16: Mean HTLs for Each Test - Robins AFB (n=689)

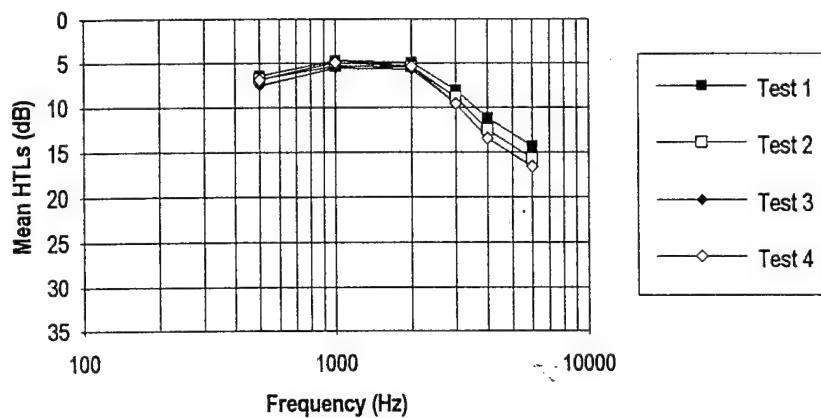


Figure 17: Mean HTLs for Each Test - Shaw AFB (n=481)

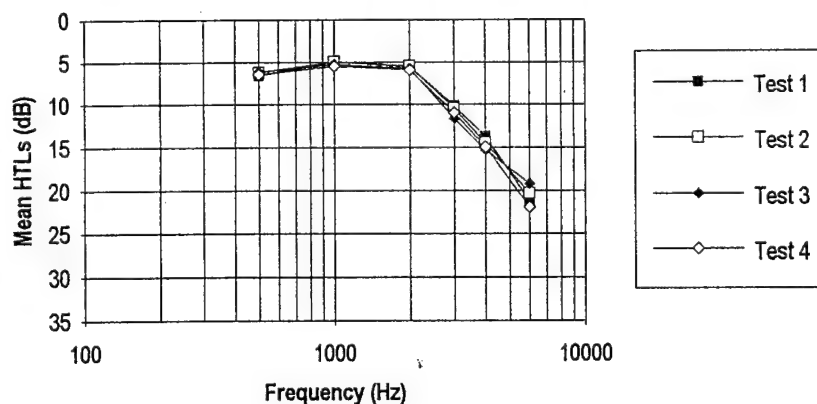
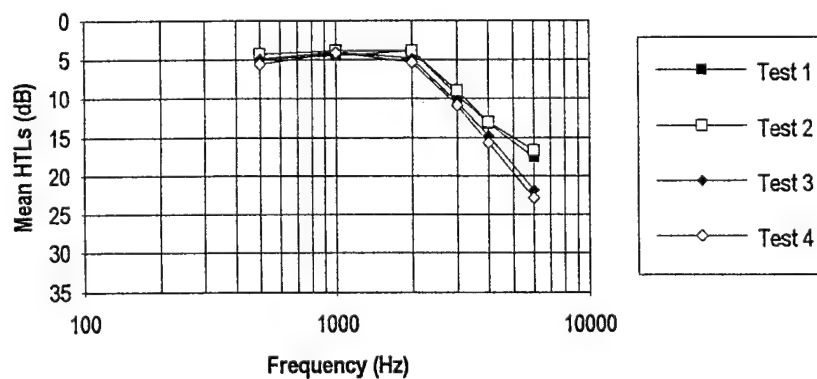
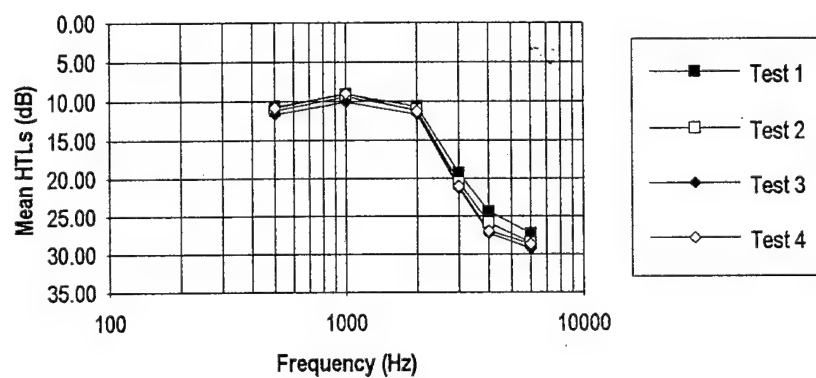


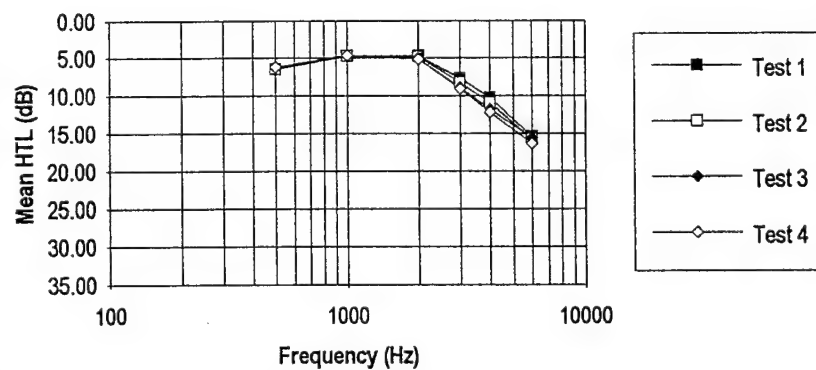
Figure 18: Mean HTLs for Each Test - Seymour-Johnson AFB (n=80)



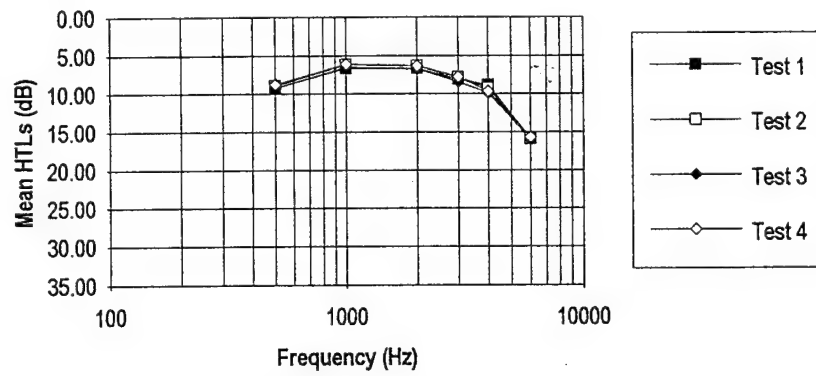
**Figure 19: Mean HTLs for Each Test**  
**- Civilians (n=2859)**



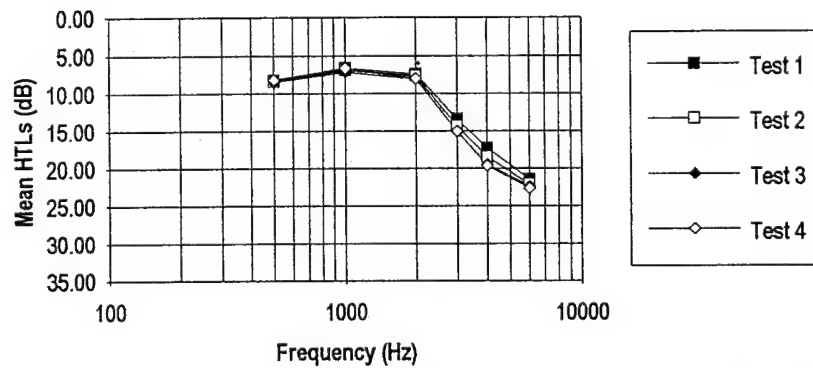
**Figure 20: Mean HTLs for Each Test**  
**- Military (n=3029)**



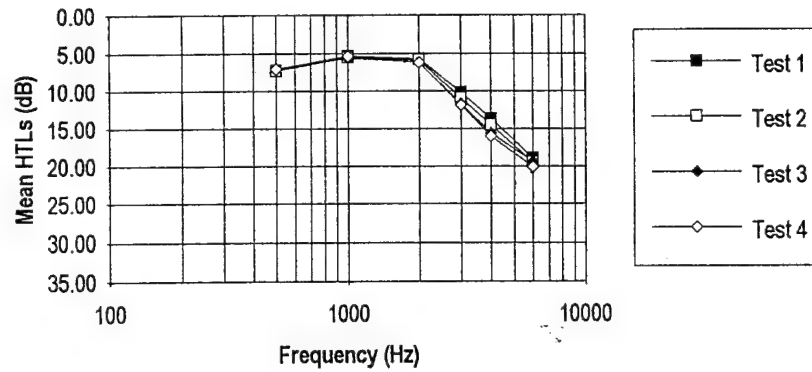
**Figure 21: Mean HTLs for Each Test**  
**- Males (n=6207)**



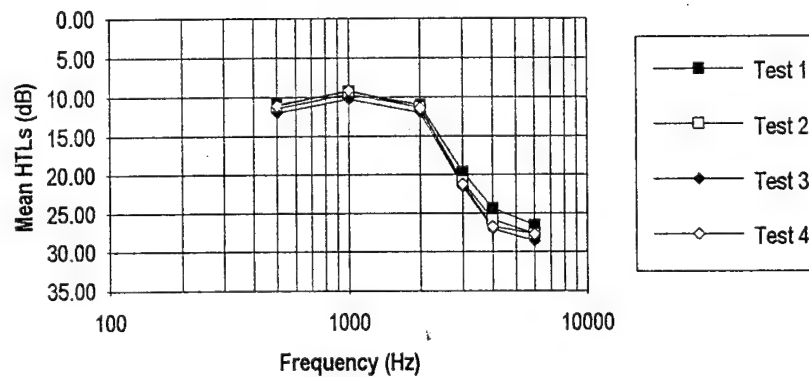
**Figure 22: Mean HTLs for Each Test**  
**- Females (365)**



**Figure 23: Mean HTLs for Each Test**  
- Whites (n=3252)



**Figure 24: Mean HTLs for Each Test**  
- Hispanics (n=2038)



**Figure 25: Mean HTLs for Each Test**  
- Blacks (n=506)

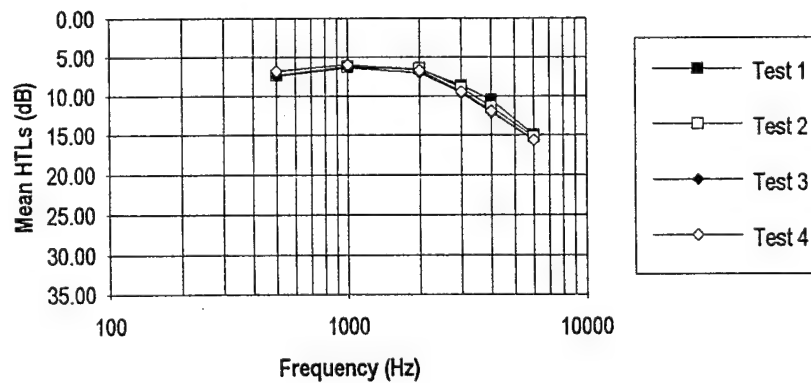




Figure 26: Mean HTLs vs Age - All 8 Bases (n=6655)

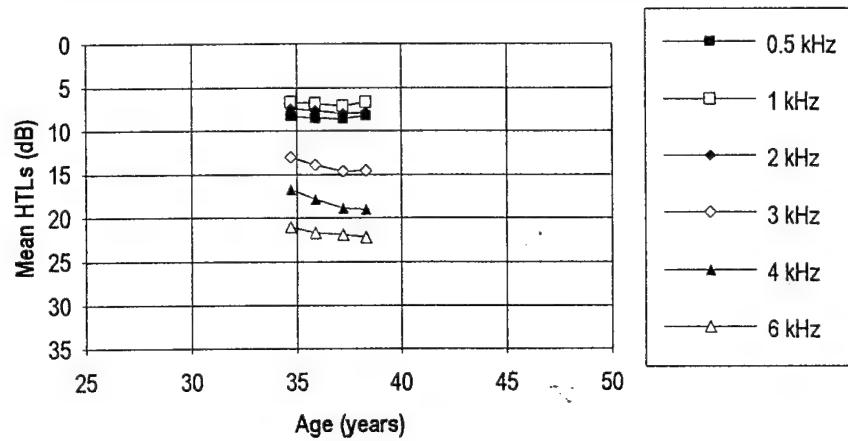


Figure 27: Mean HTLs vs Age - Charleston AFB (n=962)

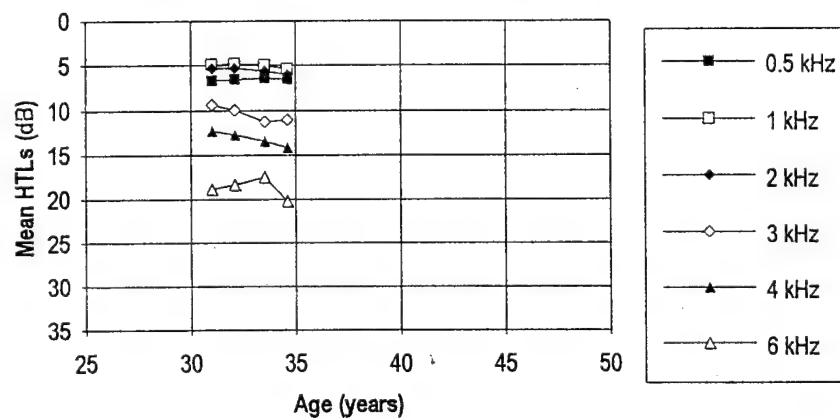


Figure 28: Mean HTLs vs Age - Kelly AFB (n=3052)

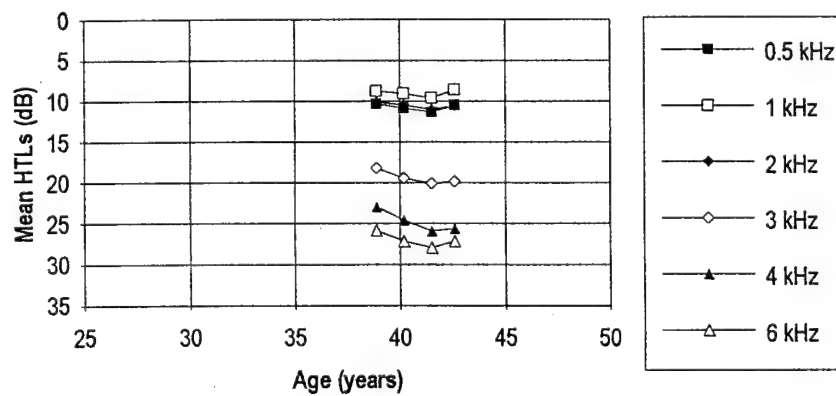


Figure 29: Mean HTLs vs Age - Langley AFB (n=359)

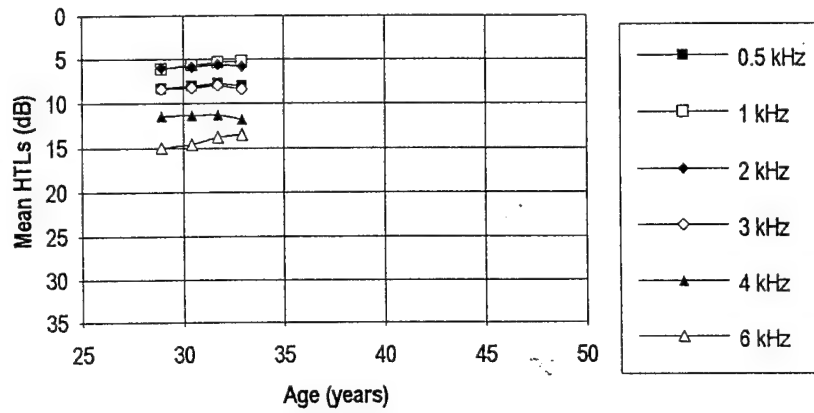


Figure 30: Mean HTLs vs Age - Pope AFB (n=743)

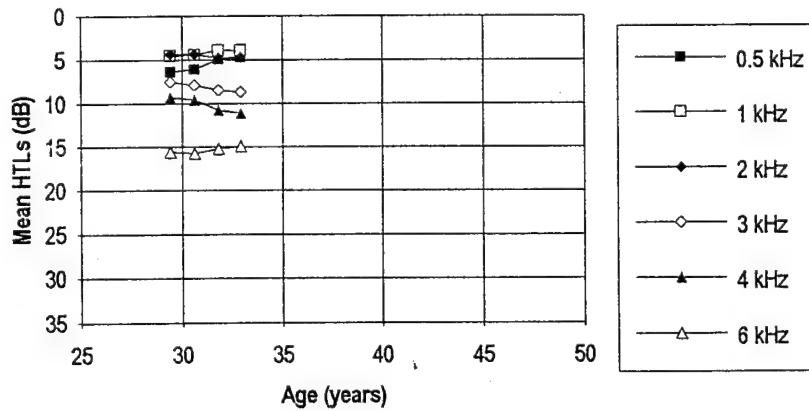


Figure 31: Mean HTLs vs Age - Randolph AFB (n=286)

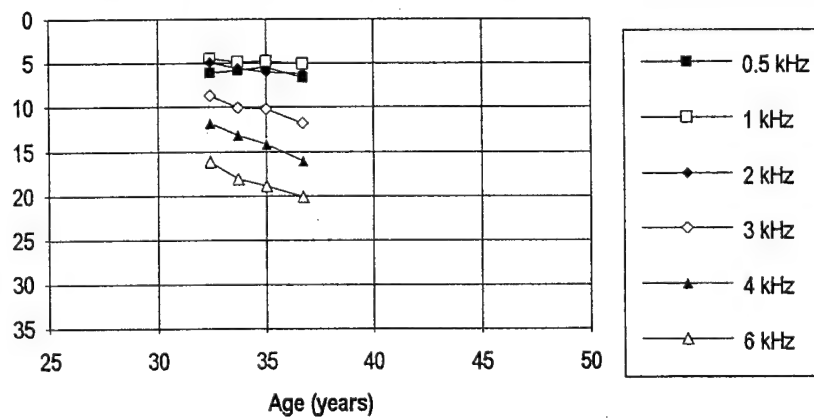


Figure 32: Mean HTLs vs Age - Robins AFB (n=689)

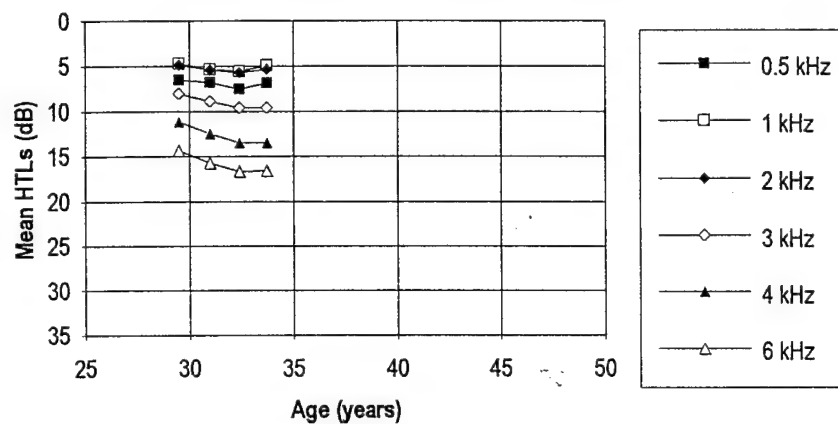


Figure 33: Mean HTLs vs Age - Shaw AFB (n=481)

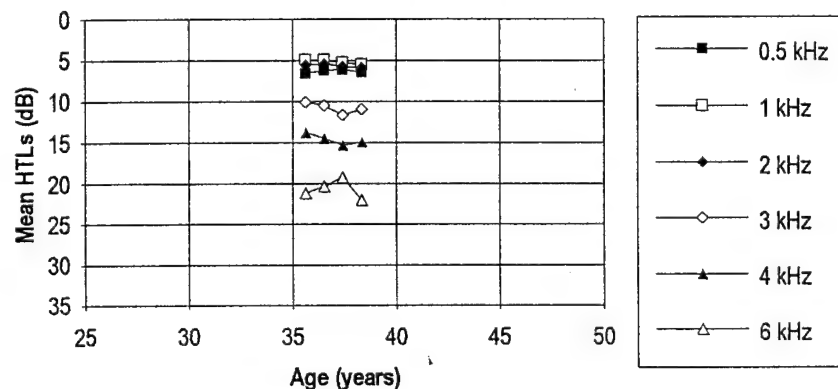
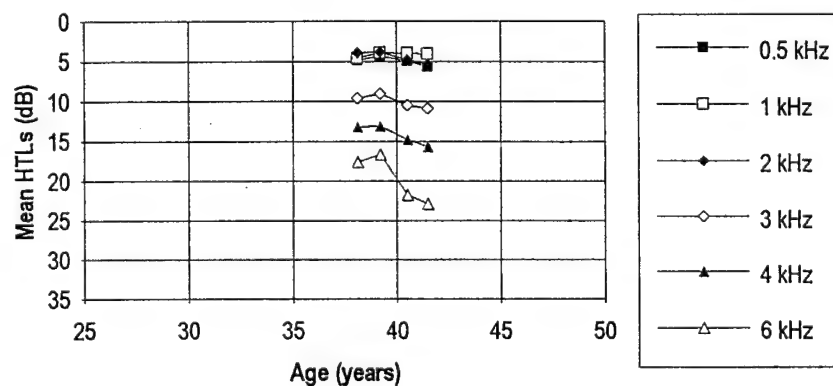
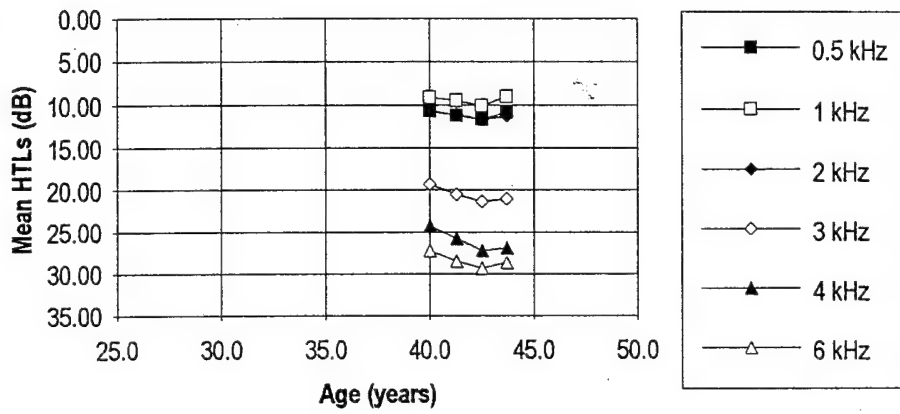


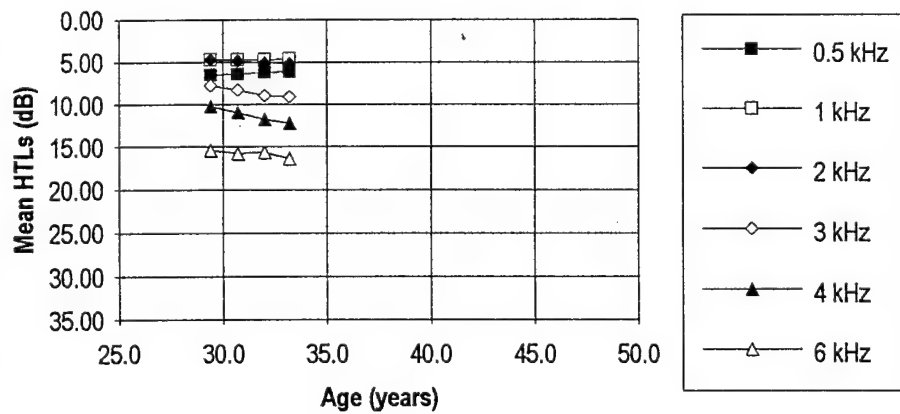
Figure 34: Mean HTLs vs Age - Seymour-Johnson AFB (n=80)



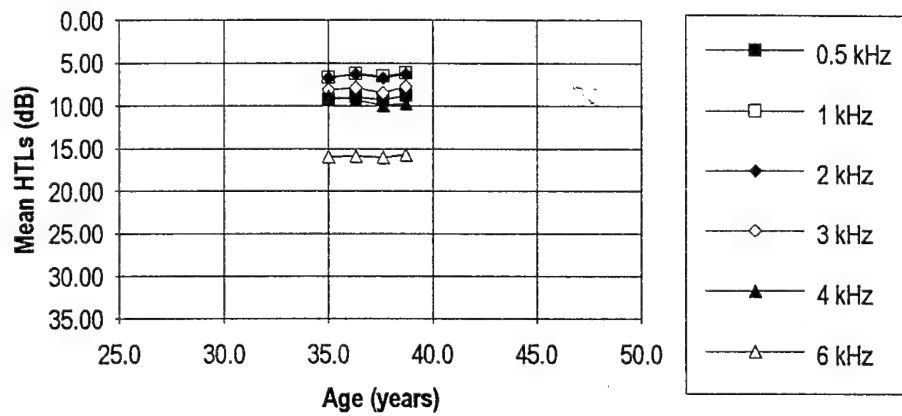
**Figure 35: Mean HTLs vs Age**  
**- Civilians (n=2859)**



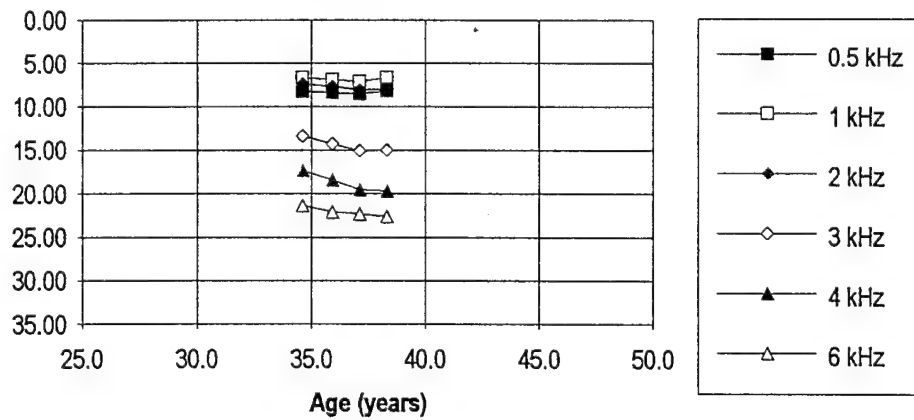
**Figure 36: Mean HTLs vs Age**  
**- Military (n=3029)**



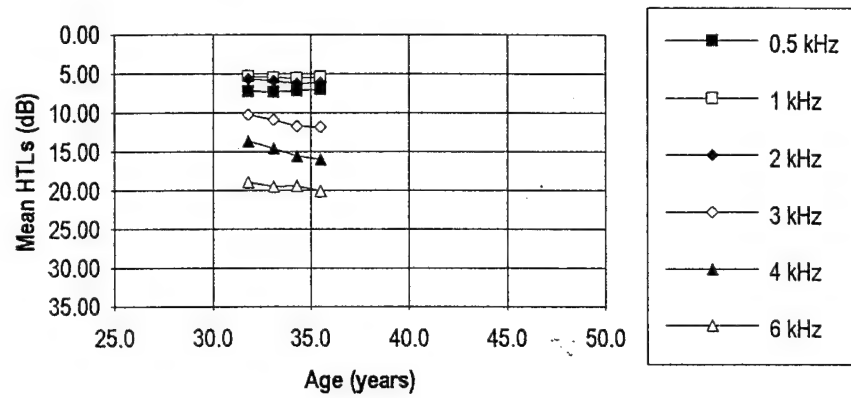
**Figure 37: Mean HTLs vs Age**  
**- Males (n=6207)**



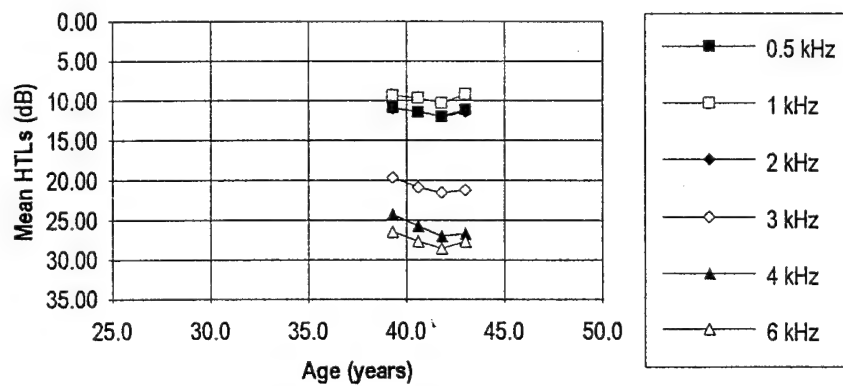
**Figure 38: Mean HTLs vs Age**  
**- Females (n=365)**



**Figure 39: Mean HTLs vs Age**  
- Whites (n=3252)



**Figure 40: Mean HTLs vs Age**  
- Hispanics (n=2038)



**Figure 41: Mean HTLs vs Age**  
- Blacks (n=506)

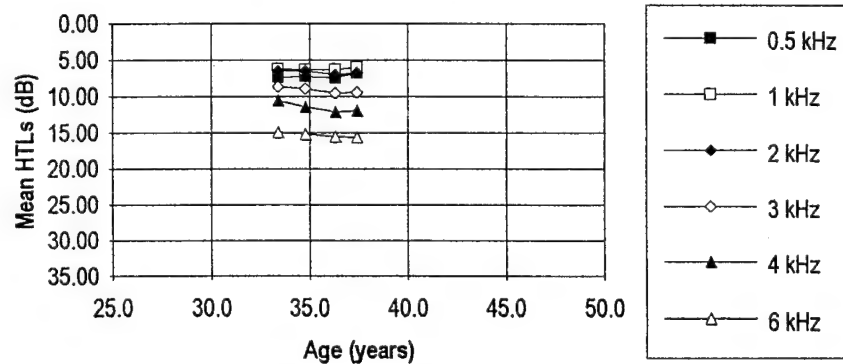


Figure 42: All Eight AFBs - Distribution of Leq's

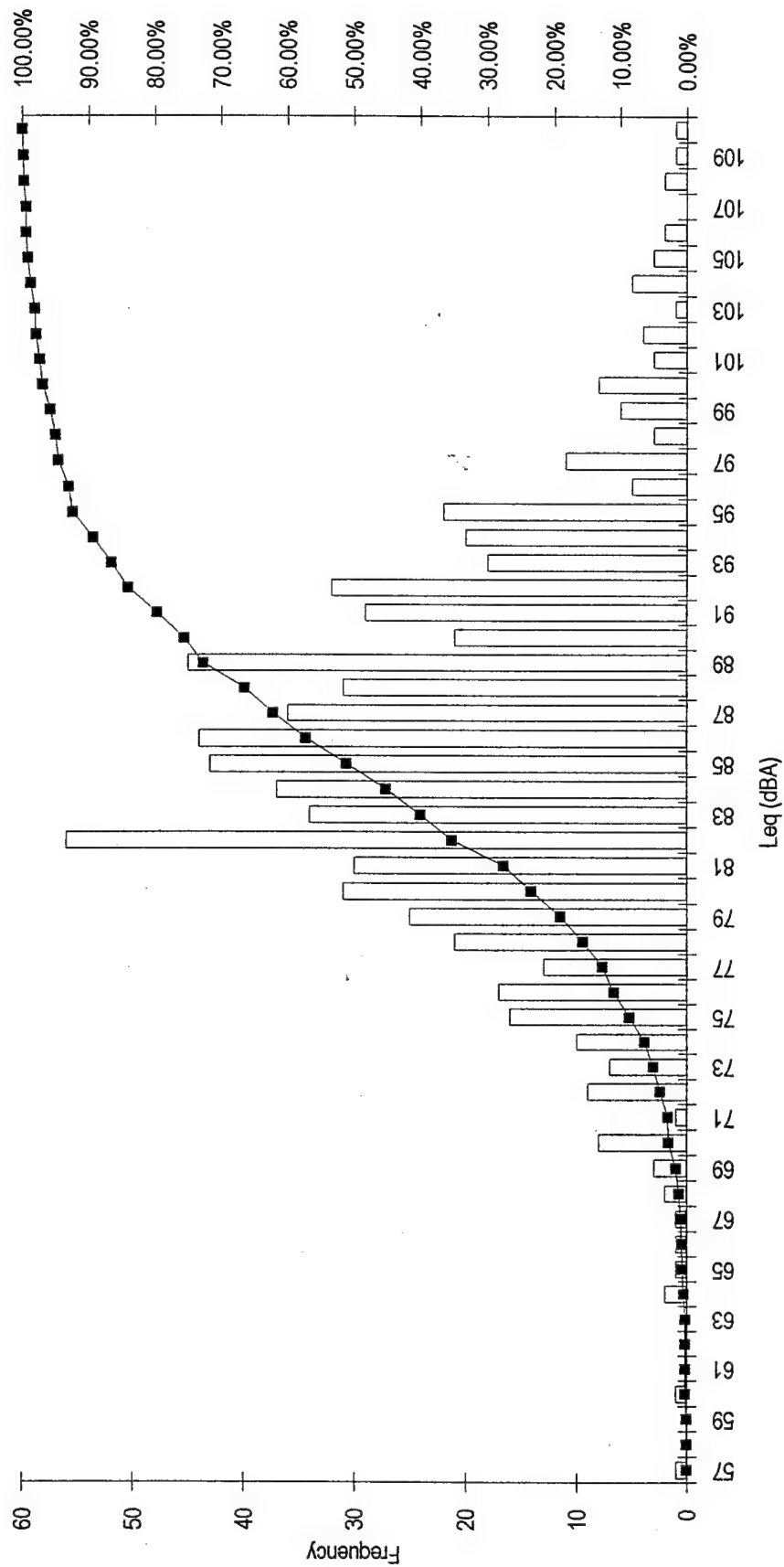


Figure 43: Charleston AFB - Distribution of Leq's

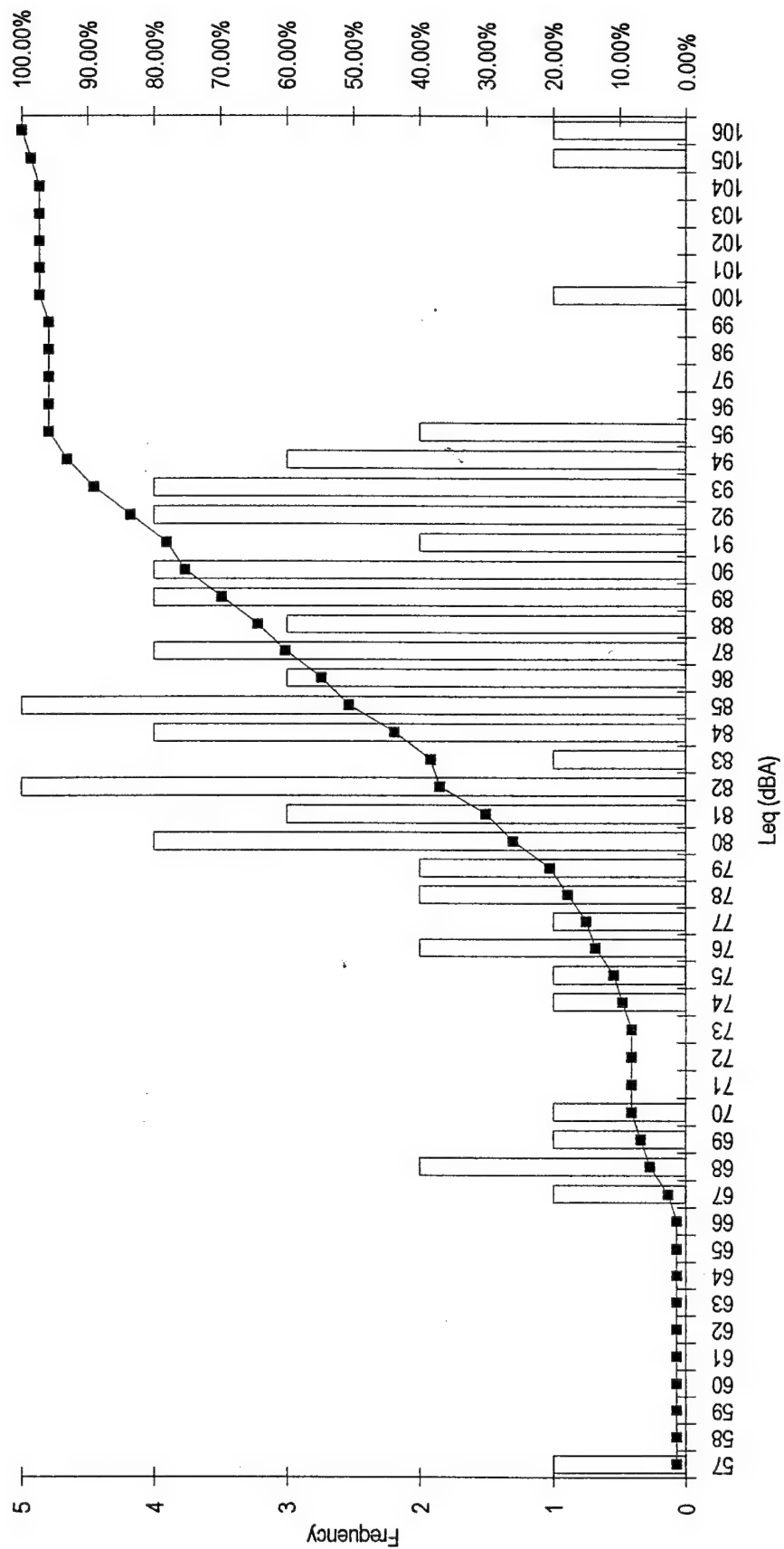




Figure 44: Kelly AFB - Distribution of Leq's

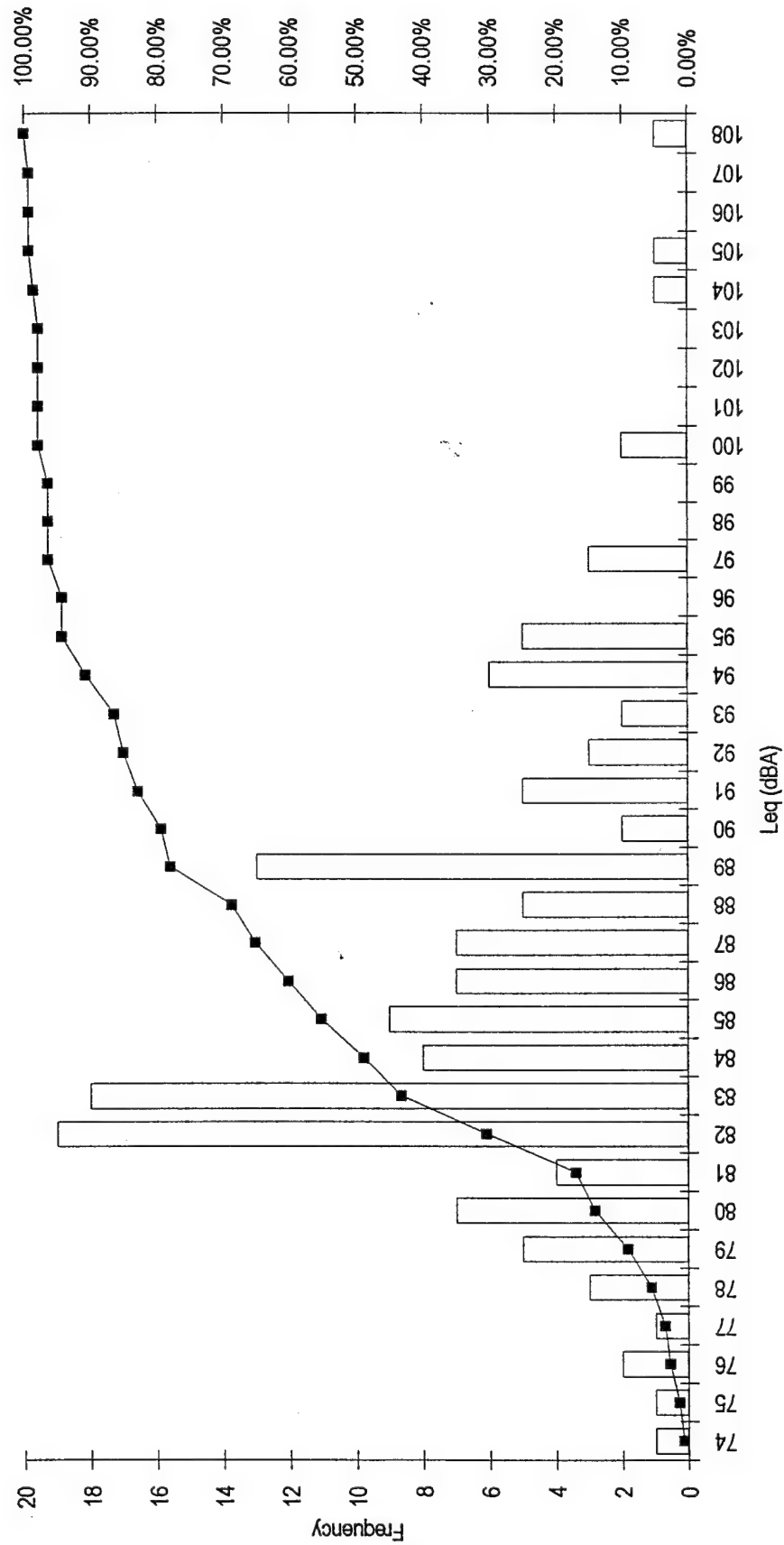


Figure 45: Langley AFB - Distribution of Leq's

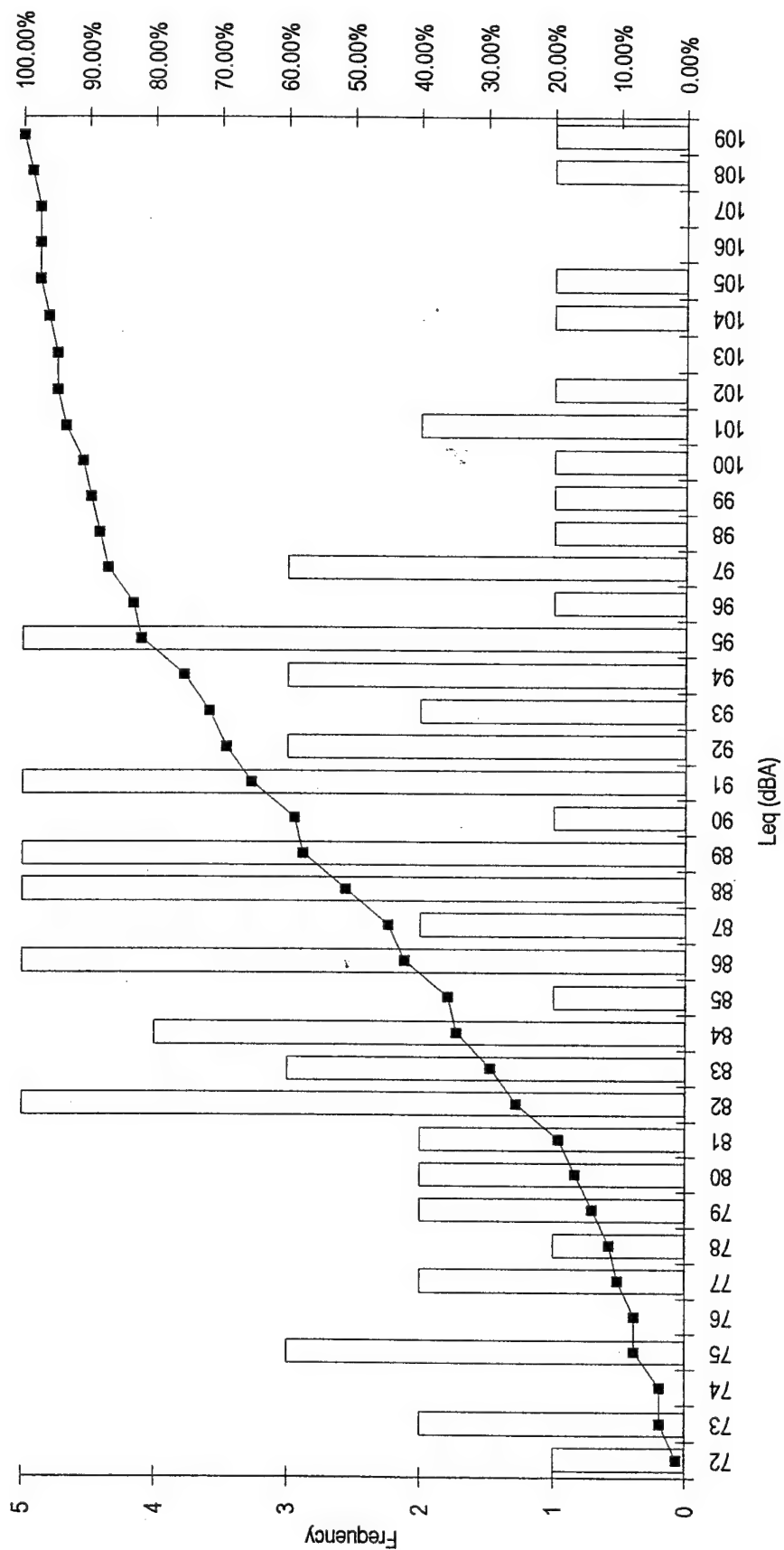


Figure 46: Pope AFB - Distribution of Leq's

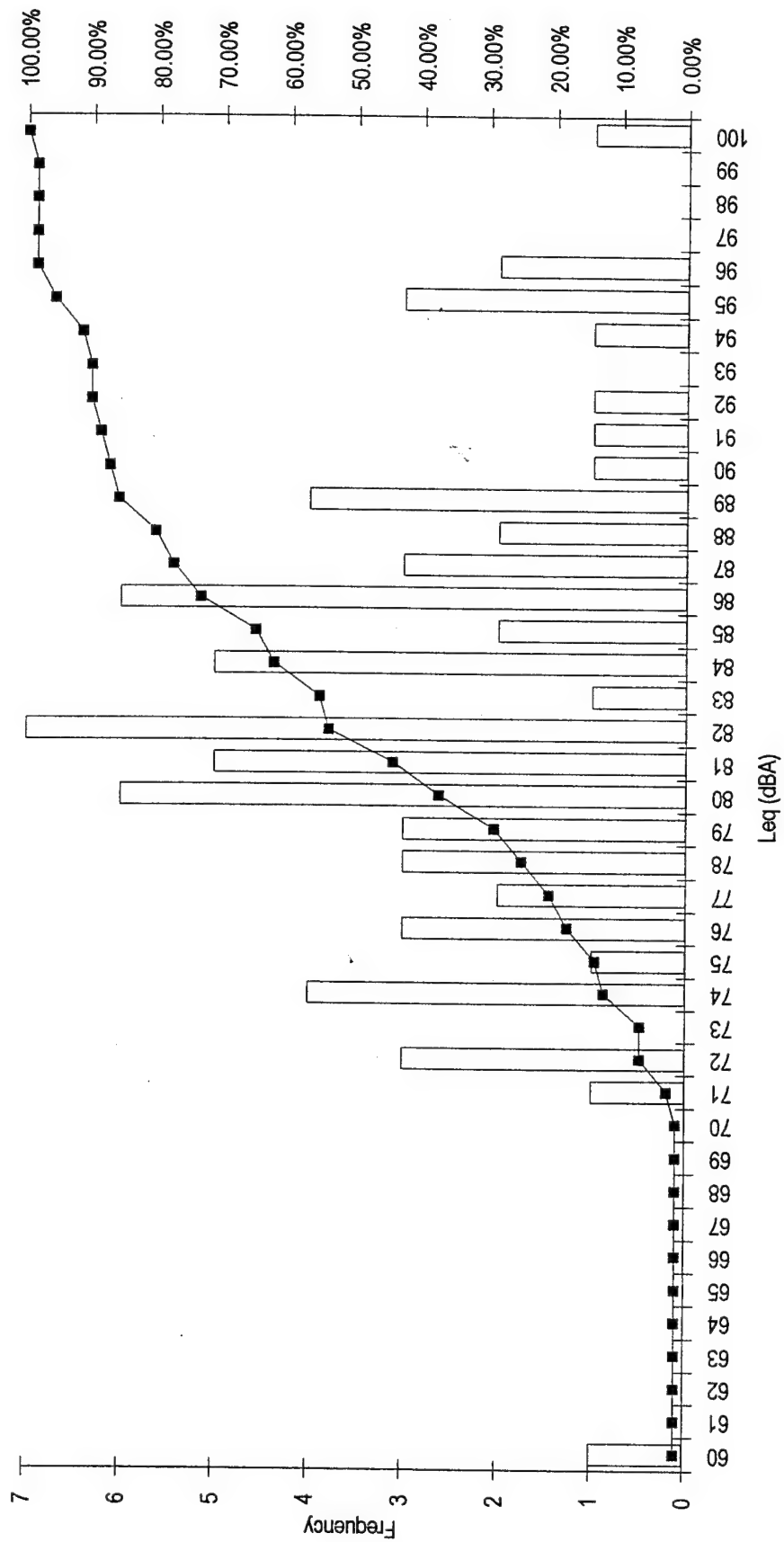


Figure 47: Randolph AFB - Distribution of Leq's

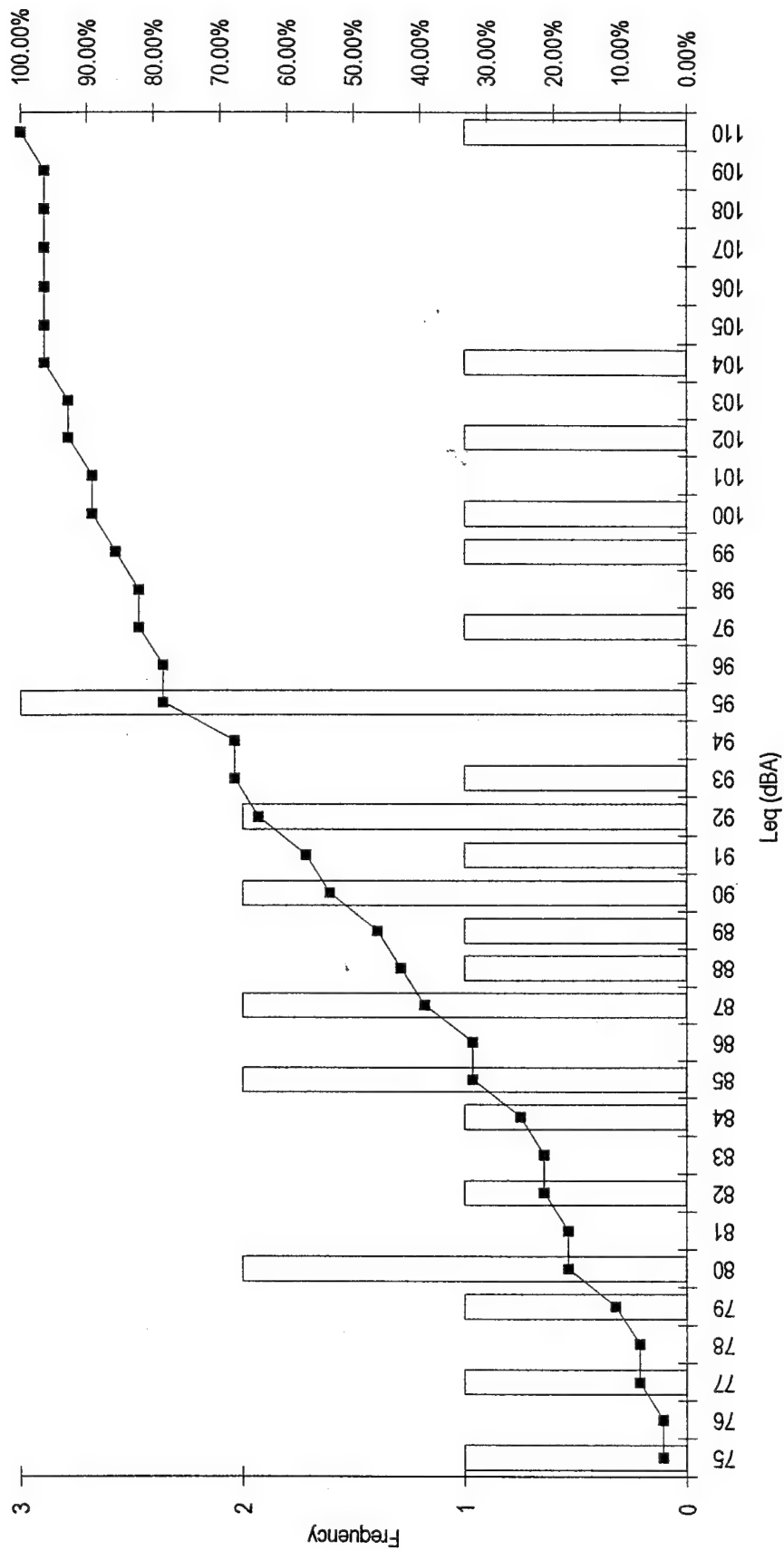


Figure 48: Robins AFB - Distribution of Leq's

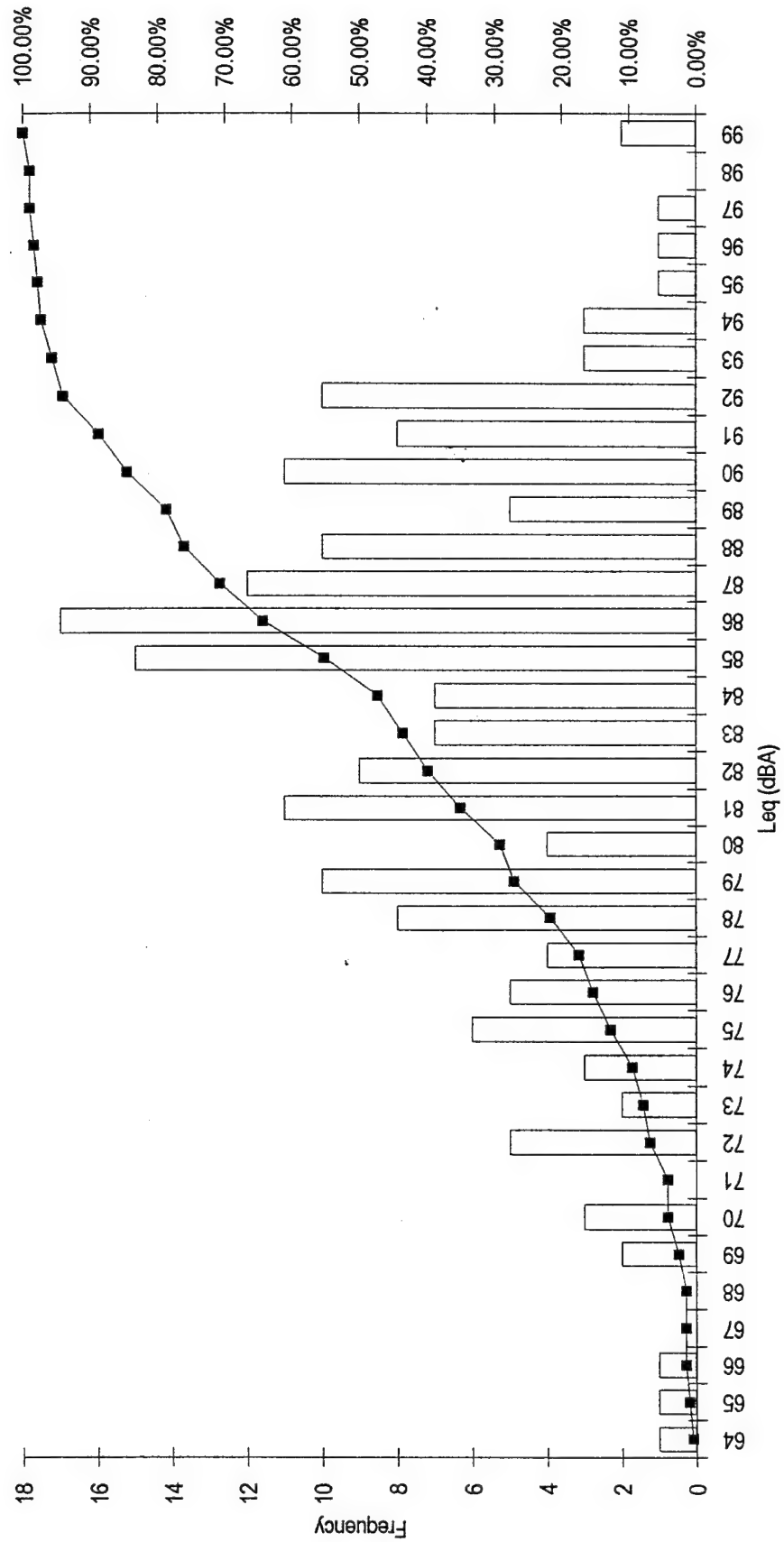


Figure 49: Seymour-Johnson AFB - Distribution of Leq's

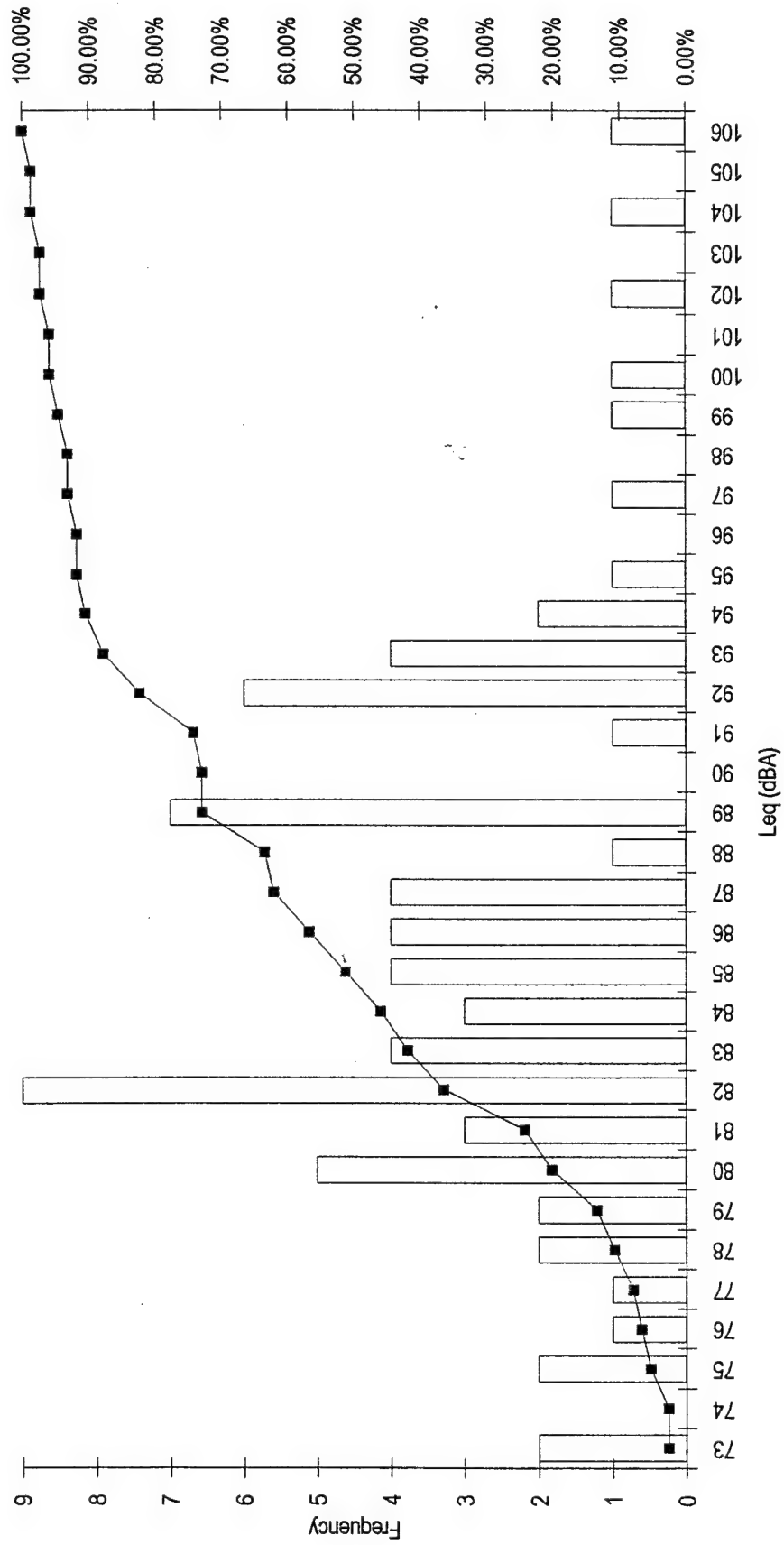
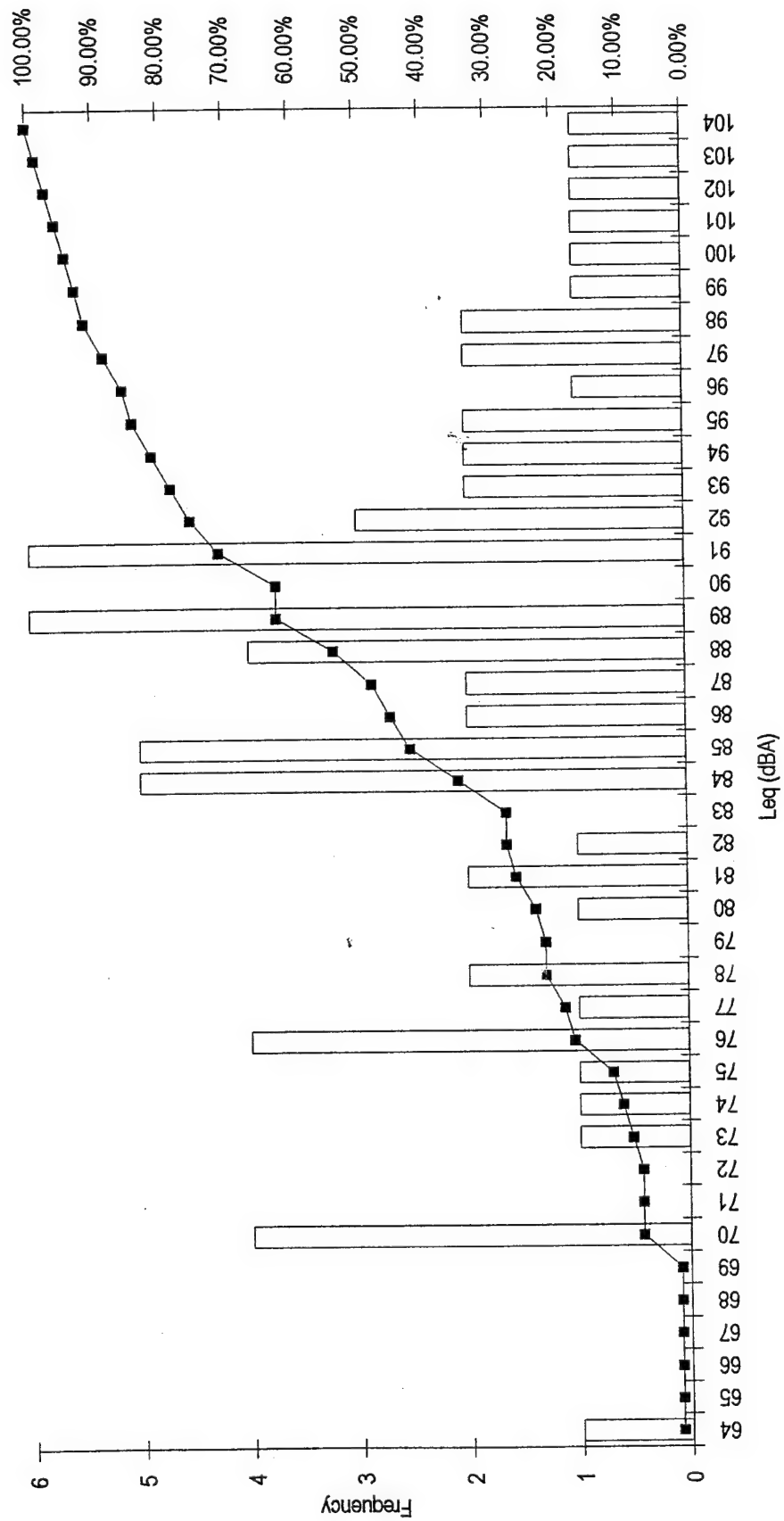


Figure 50: Shaw AFB - Distribution of Leq's



## Appendix C: Group Descriptive Statistics

<u>Page</u>	<u>Tables</u>
C-1	Group Descriptive Statistics



	ALL AFBs (N=6655)			
	Test 1	Test 2	Test 3	Test 4
Avg Age (y)	34.7	35.9	37.2	38.3
Avg Service (y)	6.9	8.2	9.4	10.5

	Charleston AFB (N=962)			
	Test 1	Test 2	Test 3	Test 4
Avg Age (y)	31.0	32.1	33.5	34.6
Avg Service (y)	6.5	7.6	9.0	10.0

	Randolph AFB (N=286)			
	Test 1	Test 2	Test 3	Test 4
Avg Age (y)	32.4	33.7	35.0	36.7
Avg Service (y)	6.9	8.0	9.4	11.0

	Kelly AFB (N=3052)			
	Test 1	Test 2	Test 3	Test 4
Avg Age (y)	38.9	40.2	41.5	42.6
Avg Service (y)	7.2	8.5	9.8	10.9

	Robins AFB (N=689)			
	Test 1	Test 2	Test 3	Test 4
Avg Age (y)	29.5	31.0	32.4	33.7
Avg Service (y)	6.3	7.8	9.2	10.4

	Langley AFB (N=359)			
	Test 1	Test 2	Test 3	Test 4
Avg Age (y)	28.9	30.4	31.7	32.9
Avg Service (y)	5.8	7.3	8.6	9.8

	Shaw AFB (N=481)			
	Test 1	Test 2	Test 3	Test 4
Avg Age (y)	35.5	36.5	37.4	38.3
Avg Service (y)	8.2	9.2	10.2	11.1

	Pope AFB (N=743)			
	Test 1	Test 2	Test 3	Test 4
Avg Age (y)	29.4	30.6	31.8	32.9
Avg Service (y)	6.0	7.2	8.3	9.4

	Seymour-Johnson AFB (N=80)			
	Test 1	Test 2	Test 3	Test 4
Avg Age (y)	38.1	39.2	40.5	41.5
Avg Service (y)	9.3	10.4	11.6	12.7

	White (N=3252)			
	Test 1	Test 2	Test 3	Test 4
Avg Age (y)	31.8	33.0	34.3	35.5
Avg Service (y)	6.5	7.7	9.0	10.2

	Black (N=506)			
	Test 1	Test 2	Test 3	Test 4
Avg Age (y)	33.4	34.8	36.3	37.4
Avg Service (y)	6.7	8.1	9.5	10.6

	Hispanic (N=2038)			
	Test 1	Test 2	Test 3	Test 4
Avg Age (y)	39.3	40.6	41.8	43.0
Avg Service (y)	7.6	8.8	10.1	11.2

	Military (N=3029)			
	Test 1	Test 2	Test 3	Test 4
Avg Age (y)	29.4	30.7	32.0	33.2
Avg Service (y)	6.2	7.5	8.8	10.0

	Civilian (N=2859)			
	Test 1	Test 2	Test 3	Test 4
Avg Age (y)	40.0	41.3	42.5	43.7
Avg Service (y)	7.5	8.8	10.1	11.2

	Male (N=6207)			
	Test 1	Test 2	Test 3	Test 4
Avg Age (y)	34.6	35.9	37.1	38.3
Avg Service (y)	7.0	8.2	9.5	10.6

	Female (N=365)			
	Test 1	Test 2	Test 3	Test 4
Avg Age (y)	35.0	36.3	37.6	38.7
Avg Service (y)	5.6	6.9	8.2	9.3

## **Appendix D: First Page Output of CMPALL.EXE Program**

<u>Page</u>	<u>Output</u>
D-1	First Page Output of CMPALL.EXE Program

COMPARISON BETWEEN AUDIOGRAMS REPORT GENERATOR -- PC Version 2.1 -- 941218  
 (C) 1993 ENVIRONMENTAL NOISE CONSULTANTS, INC  
 DR. LARRY H. ROYSTER  
 DR. JULIA D. ROYSTER  
 P.O. BOX 30698  
 RALEIGH, NC. 27622-0698  
 TELEPHONE: (919) 782-1624  
 FAX: (919) 781-2396  
 PC SOFTWARE VERSION BY:  
 XXXXXXXXXXXXXXXXXXXXXXX  
 RODNEY THOMAS  
 MHZ BUSINESS SOLUTIONS  
 3900 W. FRIENDLY AVE.  
 GREENSBORO, NC 27410

COMPARISON BETWEEN AUDIOGRAMS REPORT GENERATOR -- PC Version 2.0 -- 941218  
 ALL REPORTS TO BE GENERATED ARE FOR EMPLOYEES WITH AT LEAST THE FIRST 4 REPORTS AUDIOGRAMS IN THEIR FILE.  
 THE FOLLOWING 3 REPORTS ARE TO BE GENERATED:

EARLY LATER  
 1 TO 2  
 2 TO 3  
 3 TO 4

LEGEND FOR LISTING BY CATEGORY NUMBER  
 AAAAAAAAAAAAAAAAAAAAAAAAAAAAA

CATEGORY 1 : MORE THAN 10 DB CHANGE AT 5 1 2 3 4 6 OR 8  
 CATEGORY 2 : 10 OR MORE DB CHANGE AT 5 1 2 3 4 6 OR 8  
 CATEGORY 3 : MORE THAN 15 DB CHANGE AT 5 1 2 3 4 6 OR 8  
 CATEGORY 4 : 15 OR MORE DB CHANGE AT 5 1 2 3 4 6 OR 8  
 CATEGORY 5 : MORE THAN 10 DB CHANGE AT 5 1 2 3 4 OR 6  
 CATEGORY 6 : 10 OR MORE DB CHANGE AT 5 1 2 3 4 OR 6  
 CATEGORY 7 : MORE THAN 15 DB CHANGE AT 5 1 2 3 4 OR 6  
 CATEGORY 8 : 15 OR MORE DB CHANGE AT 5 1 2 3 4 OR 6

CATEGORY 9 : AVG AT 2 3 4 CHANGED MORE THAN OR EQUAL TO 10 DB

CATEGORY 10: MORE THAN 10 DB CHANGE AT 5 1 2 3 OR  
 MORE THAN 15 DB CHANGE AT 4 6 8  
 CATEGORY 11: AVG AT 2 3 4 CHANGES MORE THAN 10 DB OR  
 MORE THAN 15 DB CHANGE AT 5 1 2 3 4 6 OR 8  
 CATEGORY 12: AVG AT 2 3 4 CHANGES MORE THAN 10 DB OR  
 MORE THAN 15 DB CHANGE AT 5 1 2 3 4 OR 6  
 CATEGORY 13: MORE THAN 10 DB CHANGE AT 5 1 2 OR  
 MORE THAN 15 DB CHANGE AT 3 4 6 OR 8  
 CATEGORY 14: MORE THAN 10 DB CHANGE AT 5 1 2 OR  
 MORE THAN 15 DB CHANGE AT 3 4 OR 6  
 CATEGORY 15: MORE THAN 10 DB CHANGE AT 5 1 OR  
 MORE THAN 15 DB CHANGE AT 2 OR  
 MORE THAN 20 DB CHANGE AT 3 4 6 OR 8  
 CATEGORY 16: MORE THAN 10 DB CHANGE AT 5 1 OR  
 MORE THAN 15 DB CHANGE AT 2 OR  
 MORE THAN 20 DB CHANGE AT 3 4 OR 6

NOTE -- ALL TESTS ARE MADE FOR EITHER EAR, NOT COMBINED EARS (IE. CORRESPONDING FREQUENCY LEVELS ARE NOT AVERAGED TOGETHER TO GET A SINGLE NUMBER. THE EARS ARE EXAMINED SEPARATELY.)  
 NOTE -- MANY PAIRS OF THE CATEGORIES WILL GIVE IDENTICAL RESULTS BECAUSE NO READING WAS MADE AT THE 8K FREQUENCY LEVEL.

## **Appendix E: Shift Results for All Eight AFBs**

<u>Page</u>	<u>Shift Result</u>
E-1	Test 1-2 Comparison
E-2	Test 2-3 Comparison
E-3	Test 3-4 Comparison





TEST 3 TO 4 COUNT OF PEOPLE IN THIS GROUP= 6655

AAAAAAAAAAAA

DB 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS COMBINED EAR

LEFT EAR RIGHT EAR HEARING GOT WORSE \*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

40	3	1	3	6	14	22	0	0	4	3	3	3	7	32	0	0	1	1	2	2	8	10	0	0
35	1	0	2	1	3	10	0	0	2	1	2	1	3	12	0	0	2	1	1	1	0	9	0	0
30	8	6	4	5	13	28	0	0	4	4	3	7	8	23	0	0	0	0	0	3	2	11	0	0
25	3	2	6	12	17	54	0	0	7	5	8	8	15	54	0	0	6	1	5	1	8	22	0	0
20	21	12	11	32	45	156	0	0	23	13	17	34	55	151	0	0	7	7	3	10	16	63	0	0
15	59	33	53	74	139	276	0	0	66	35	44	90	137	278	0	0	25	18	20	31	49	158	0	0
10	345	199	220	383	520	728	0	0	309	227	249	395	537	709	0	0	140	67	84	194	236	457	0	0
5	1233	1082	1183	1294	1330	1191	0	0	1203	1053	1051	1290	1312	1161	0	0	805	616	650	862	1067	1137	0	0
0	2870	3463	3541	2849	2489	1763	6655	6655	3059	3463	3682	2977	2574	1833	6655	6655	4398	4877	4986	4338	3963	2951	6655	6655
-5	1561	1518	1302	1441	1373	1195	0	0	1514	1508	1239	1330	1332	1190	0	0	1062	938	785	995	1020	1209	0	0
-10	434	272	256	419	518	753	0	0	373	264	269	396	481	734	0	0	162	99	77	162	209	431	0	0
-15	76	42	43	72	112	279	0	0	52	42	49	67	112	287	0	0	26	22	30	35	50	128	0	0
-20	26	15	22	33	45	127	0	0	20	23	15	32	46	99	0	0	14	4	6	10	16	35	0	0
-25	8	5	4	17	13	30	0	0	8	6	11	15	19	40	0	0	6	3	2	9	4	17	0	0
-30	4	3	3	8	11	22	0	0	4	5	7	4	10	22	0	0	1	1	2	0	2	9	0	0
-35	0	0	0	4	4	10	0	0	0	1	2	0	1	9	0	0	0	0	1	1	3	4	0	0
-40	3	2	2	5	9	11	0	0	7	2	4	6	6	21	0	0	0	0	1	1	2	4	0	0

\*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

X	-0.4	-0.5	-0.1	-0.2	0.1	0.2	0.0	0.0	-0.3	-0.4	-0.2	0.0	0.1	0.2	0.0	0.0	-0.2	-0.3	-0.1	-0.1	0.1	0.2	0.0	0.0
S	5.8	4.8	5.0	6.3	7.2	9.7	0.0	0.0	5.7	5.0	5.2	6.1	7.0	9.8	0.0	0.0	4.0	3.3	3.5	4.3	4.9	7.1	0.0	0.0

\*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

CATEGORY NUMBER

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WORSE	1546.0	3637.0	723.0	1546.0	1546.0	3637.0	723.0	1546.0	246.0	974.0	743.0	884.0	884.0	511.0	511.0
PERCENT	23.2	54.7	10.9	23.2	23.2	54.7	10.9	23.2	3.7	14.6	11.2	13.3	13.3	7.7	7.7
BETTER	1415.0	3795.0	618.0	1414.0	1415.0	3795.0	618.0	1414.0	213.0	851.0	632.0	778.0	778.0	467.0	467.0
PERCENT	21.3	57.0	9.3	21.2	21.3	57.0	9.3	21.2	3.2	12.8	9.5	11.7	11.7	7.0	7.0
EITHER	2660.0	5583.0	1258.0	2659.0	2660.0	5583.0	1258.0	2659.0	451.0	1676.0	1290.0	1534.0	1534.0	926.0	926.0
PERCENT	40.0	83.9	18.9	40.0	40.0	83.9	18.9	40.0	6.8	25.2	19.4	23.1	23.1	13.9	13.9

## Appendix F: Shift Results for Individual AFB Groups

<u>Page</u>	<u>Shift Result</u>
F-1	Test 1-2 Comparison - Charleston AFB
F-2	Test 2-3 Comparison - Charleston AFB
F-3	Test 3-4 Comparison - Charleston AFB
F-4	Test 1-2 Comparison - Kelly AFB
F-5	Test 2-3 Comparison - Kelly AFB
F-6	Test 3-4 Comparison - Kelly AFB
F-7	Test 1-2 Comparison - Langley AFB
F-8	Test 2-3 Comparison - Langley AFB
F-9	Test 3-4 Comparison - Langley AFB
F-10	Test 1-2 Comparison - Pope AFB
F-11	Test 2-3 Comparison - Pope AFB
F-12	Test 3-4 Comparison - Pope AFB
F-13	Test 1-2 Comparison - Randolph AFB
F-14	Test 2-3 Comparison - Randolph AFB
F-15	Test 3-4 Comparison - Randolph AFB
F-16	Test 1-2 Comparison - Robins AFB
F-17	Test 2-3 Comparison - Robins AFB
F-18	Test 3-4 Comparison - Robins AFB
F-19	Test 1-2 Comparison - Seymour-Johnson AFB
F-20	Test 2-3 Comparison - Seymour-Johnson AFB
F-21	Test 3-4 Comparison - Seymour-Johnson AFB
F-22	Test 1-2 Comparison - Shaw AFB
F-23	Test 2-3 Comparison - Shaw AFB
F-24	Test 3-4 Comparison - Shaw AFB



TEST 1 TO 2

COMBINED EAR

DB 500 1000 2000

XXXXXXXXXXXX

40	0	1
35	1	0
30	1	1
25	3	1
20	10	3
15	15	1
10	57	41
5	169	158
0	421	530
-5	191	175
-10	61	39
-15	20	9
-20	10	2
-25	3	1
-30	0	0
-35	0	0
-40	0	0

X	-0.2	-0.1
S	6.7	5.0

1			
	WORSE	256.0	
	PERCENT	26.6	
	BETTER	255.0	
	PERCENT	26.5	
	EITHER	460.0	
	PERCENT	47.8	

TEST 2 TO 3 COUNT OF PEOPLE IN THIS GROUP== 962

[illegible]

\*\*\*\*\* HEARING GOT WORSE \*\*\*\*\*

40	1	1	0	1	2	3	0	0	1	0	0	0	1	3	0	0	0	0	0	0
35	0	1	0	1	3	2	0	0	0	1	0	1	1	2	0	0	0	0	3	0
30	1	1	1	2	5	4	0	0	0	0	1	1	1	5	0	0	1	2	3	0
25	2	1	1	0	2	10	0	0	2	0	1	3	3	9	0	0	3	1	0	0
20	5	5	6	9	7	24	0	0	2	3	1	7	12	7	0	0	0	1	0	0
15	12	6	9	14	26	43	0	0	4	1	5	14	19	34	0	0	5	3	1	0
10	53	35	43	90	68	98	0	0	36	37	39	65	94	96	0	0	13	11	16	0
5	200	181	171	267	181	143	0	0	180	159	150	226	203	171	0	0	132	113	111	0
0	418	544	573	384	401	225	962	962	512	556	576	476	400	280	962	962	654	716	734	0
-5	199	137	125	137	154	190	0	0	149	155	138	118	160	153	0	0	119	99	85	0
-10	43	41	24	43	70	114	0	0	53	41	41	39	45	102	0	0	23	13	9	0
-15	14	2	2	5	29	50	0	0	11	5	9	11	12	57	0	0	9	2	2	0
-20	6	2	2	6	7	30	0	0	8	2	1	1	4	21	0	0	2	0	1	0
-25	5	3	1	1	1	10	0	0	3	0	0	0	2	9	0	0	1	0	2	0
-30	1	1	2	1	4	8	0	0	0	0	0	0	1	5	0	0	0	2	0	0
-35	1	0	0	0	0	4	0	0	0	1	0	0	0	1	0	0	1	0	0	0
-40	1	1	2	1	2	4	0	0	1	0	0	0	0	7	0	0	0	0	0	0

\*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

$\lambda$	-0.1	0.3	0.5	1.4	0.2	-0.9	0.0	0.0	-0.3	-0.0	0.0	1.1	1.2	-0.7	0.0	0.0	-0.1	0.1	0.2	0.9	0.6	-0.7	0.0	0.0
-----------	------	-----	-----	-----	-----	------	-----	-----	------	------	-----	-----	-----	------	-----	-----	------	-----	-----	-----	-----	------	-----	-----

	6.5	5.5	5.3	6.4	7.9	10.9	0.0	0.0	5.7	4.8	4.6	5.6	6.9	10.1	0.0	0.0	4.3	3.6	3.3	4.1	5.0	7.9	0.0	0.0
--	-----	-----	-----	-----	-----	------	-----	-----	-----	-----	-----	-----	-----	------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

**THE UNIVERSITY OF CHICAGO**

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
Worse	234.0	555.0	119.0	234.0	234.0	555.0	119.0	234.0	52.0	154.0	121.0	121.0	138.0	138.0	88.0	88.0
Percent	24.3	57.7	12.4	24.3	24.3	57.7	12.4	24.3	5.4	16.0	12.6	12.6	14.3	14.3	9.1	9.1
Better	253.0	548.0	129.0	253.0	253.0	548.0	129.0	253.0	25.0	165.0	131.0	131.0	157.0	157.0	105.0	105.0
Percent	26.3	57.0	13.4	26.3	26.3	57.0	13.4	26.3	2.6	17.2	13.6	13.6	16.3	16.3	10.9	10.9
Neither	436.0	814.0	231.0	436.0	436.0	814.0	231.0	436.0	76.0	292.0	234.0	234.0	274.0	274.0	183.0	183.0
Percent	45.3	84.6	24.0	45.3	45.3	84.6	24.0	45.3	7.9	30.4	24.3	24.3	28.5	28.5	19.0	19.0

TEST 3 TO 4 COUNT OF PEOPLE IN THIS GROUP= 962

AAAAAAAAAAAA

DB 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS  
LEFT EAR RIGHT EAR COMBINED EAR  
\*\*\*\*\* HEARING GOT WORSE \*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

40	1	0	0	0	4	3	0	0	1	0	0	1	2	13	0	0	1	0	0	0	1	0	0	1	3	0	0
35	0	0	0	0	1	5	0	0	1	1	1	1	1	4	0	0	0	0	0	0	0	0	1	0	1	0	0
30	1	2	1	0	3	12	0	0	0	0	1	1	0	4	0	0	0	0	0	0	0	0	0	0	4	0	0
25	2	0	2	3	6	16	0	0	4	0	1	0	4	12	0	0	1	0	0	0	1	0	0	2	8	0	0
20	5	4	3	6	5	35	0	0	5	4	3	5	11	45	0	0	3	2	1	1	5	22	0	0	0	0	0
15	7	4	11	14	20	60	0	0	17	7	8	21	16	67	0	0	5	3	7	5	13	43	0	0	0	0	0
10	53	43	36	67	107	159	0	0	61	59	56	75	100	142	0	0	31	16	15	35	34	117	0	0	0	0	0
5	184	166	188	140	187	170	0	0	180	213	162	167	178	176	0	0	132	117	113	121	179	200	0	0	0	0	0
0	412	543	541	388	360	228	962	962	472	499	572	446	404	253	962	962	630	741	742	608	571	387	962	962	962	962	
-5	217	163	130	248	159	125	0	0	174	142	124	166	164	118	0	0	134	72	68	157	123	115	0	0	0	0	0
-10	62	27	36	70	81	85	0	0	38	31	25	55	54	77	0	0	19	6	9	24	24	40	0	0	0	0	0
-15	10	3	6	13	19	33	0	0	3	2	2	9	13	24	0	0	2	3	5	7	5	12	0	0	0	0	0
-20	3	4	6	7	4	16	0	0	3	2	1	12	8	11	0	0	3	1	0	1	3	4	0	0	0	0	0
-25	4	1	1	2	2	5	0	0	2	2	3	3	4	7	0	0	1	1	1	2	2	2	0	0	0	0	0
-30	0	0	1	3	2	5	0	0	0	0	1	0	1	4	0	0	0	0	0	0	0	1	0	0	0	0	0
-35	0	0	0	0	1	2	0	0	0	0	1	0	1	2	0	0	0	0	1	0	0	2	0	0	0	0	0
-40	1	2	0	1	1	3	0	0	1	0	1	0	1	3	0	0	0	0	0	0	0	1	0	0	0	0	0

\*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

X -0.3 0.2 0.3 -0.7 0.7 2.4 0.0 0.0 0.6 0.8 0.6 0.3 0.7 3.0 0.0 0.0 0.2 0.3 0.3 -0.1 0.6 2.4 0.0 0.0  
S 6.1 5.2 5.2 6.6 7.9 10.9 0.0 0.0 6.0 5.0 5.3 6.5 7.3 11.0 0.0 0.0 4.4 3.2 3.5 4.4 5.0 8.0 0.0 0.0

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	CATEGORY NUMBER															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WORSE	332.0	670.0	173.0	332.0	332.0	670.0	173.0	332.0	41.0	220.0	177.0	177.0	202.0	202.0	118.0	118.0
PERCENT	34.5	69.6	18.0	34.5	34.5	69.6	18.0	34.5	4.3	22.9	18.4	18.4	21.0	21.0	12.3	12.3
BETTER	204.0	527.0	105.0	204.0	204.0	527.0	105.0	204.0	34.0	135.0	107.0	107.0	120.0	120.0	74.0	74.0
PERCENT	21.2	54.8	10.9	21.2	21.2	54.8	10.9	21.2	3.5	14.0	11.1	11.1	12.5	12.5	7.7	7.7
EITHER	461.0	846.0	258.0	461.0	461.0	846.0	258.0	461.0	75.0	318.0	263.0	263.0	293.0	293.0	177.0	177.0
PERCENT	47.9	87.9	26.8	47.9	47.9	87.9	26.8	47.9	7.8	33.1	27.3	27.3	30.5	30.5	18.4	18.4





TEST 3 TO 4 COUNT OF PEOPLE IN THIS GROUP= 3052

*****																																					
LEFT EAR														RIGHT EAR														COMBINED EAR									
DB	500	1000	2000	3000	4000	6000	8000	1KRTS	500	1000	2000	3000	4000	6000	8000	1KRTS	500	1000	2000	3000	4000	6000	8000	1KRTS	500	1000	2000	3000	4000	6000	8000	1KRTS					
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X	-0.8	-1.0	-0.4	-0.3	-0.3	-0.6	0.0	0.0	-0.9	-1.1	-0.6	-0.3	-0.2	-1.0	0.0	0.0	-0.6	-0.7	-0.3	-0.3	-0.2	-0.7	0.0	0.0
S	5.8	4.8	5.0	6.1	6.8	9.1	0.0	0.0	5.8	5.2	5.5	6.2	7.2	9.6	0.0	0.0	4.1	3.5	3.6	4.3	4.8	6.7	0.0	0.0

	CATEGORY NUMBER															
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WORSE	611.0	1520.0	263.0	611.0	611.0	1520.0	263.0	611.0	104.0	372.0	272.0	272.0	333.0	333.0	189.0	189.0
PERCENT	20.0	49.8	8.6	20.0	20.0	49.8	8.6	20.0	3.4	12.2	8.9	8.9	10.9	10.9	6.2	6.2
BETTER	708.0	1892.0	291.0	707.0	708.0	1892.0	291.0	707.0	102.0	410.0	298.0	298.0	375.0	375.0	212.0	212.0
PERCENT	23.2	62.0	9.5	23.2	23.2	62.0	9.5	23.2	3.3	13.4	9.8	9.8	12.3	12.3	6.9	6.9
EITHER	1203.0	2597.0	521.0	1202.0	1203.0	2597.0	521.0	1202.0	201.0	724.0	536.0	536.0	658.0	658.0	386.0	386.0
PERCENT	39.4	85.1	17.1	39.4	39.4	85.1	17.1	39.4	6.6	23.7	17.6	17.6	21.6	21.6	12.6	12.6



## TEST 2 TO 3 COUNT OF PEOPLE IN THIS GROUP= 359

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	LEFT EAR					RIGHT EAR					COMBINED EAR								
DB	500	1000	2000	3000	4000	500	1000	2000	3000	4000	500	1000	2000	3000	4000	5000	6000	8000	1KRTS

\*\*\*\*\* HEARING GOT WORSE \*\*\*\*\*

40	1	0	0	1	0	1	0	0	0	0	0	0	0	1	2	0	0	0	0
35	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	1	0	1	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0
25	0	0	0	0	0	4	0	0	0	0	0	0	0	1	1	0	0	0	0
20	2	2	0	2	0	6	0	0	2	0	1	1	6	0	0	0	1	0	0
15	4	0	0	5	7	10	0	0	5	3	5	4	6	11	0	0	2	0	0
10	20	12	10	15	24	40	0	0	18	7	8	13	29	25	0	0	2	4	5
5	67	59	63	75	71	58	0	0	62	58	62	73	64	62	0	0	48	37	29
0	157	190	181	150	147	91	359	359	159	188	195	160	151	103	359	359	240	264	266
-5	81	84	85	78	64	68	0	0	82	87	72	86	74	82	0	0	53	50	56
-10	17	10	18	21	29	54	0	0	23	14	15	16	26	38	0	0	9	3	2
-15	6	1	0	7	6	19	0	0	7	1	1	6	5	22	0	0	3	0	0
-20	1	0	1	2	5	3	0	0	0	0	0	0	1	3	0	0	1	0	0
-25	2	0	0	2	1	2	0	0	1	0	0	0	0	2	0	0	0	0	0
-30	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-35	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0
-40	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0

\*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

X	-0.1	-0.1	-0.5	-0.4	-0.4	-0.8	0.0	0.0	-0.5	-0.4	-0.1	-0.3	0.2	-0.8	0.0	0.0	-0.3	-0.1	-0.2	-0.2	-0.0	-0.5	0.0	0.0
S	6.4	4.7	4.6	6.6	7.3	9.5	0.0	0.0	5.7	4.6	4.5	5.1	6.4	8.8	0.0	0.0	4.1	3.2	3.0	3.9	4.9	6.7	0.0	0.0

## CATEGORY NUMBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WORSE PERCENT	66.0	181.0	27.0	66.0	66.0	181.0	27.0	66.0	6.0	43.0	28.0	28.0	37.0	37.0	23.0	23.0
	18.4	50.4	7.5	18.4	18.4	50.4	7.5	18.4	1.7	12.0	7.8	7.8	10.3	10.3	6.4	6.4
BETTER PERCENT	88.0	206.0	29.0	88.0	88.0	206.0	29.0	88.0	17.0	51.0	32.0	32.0	42.0	42.0	31.0	31.0
	24.5	57.4	8.1	24.5	24.5	57.4	8.1	24.5	4.7	14.2	8.9	8.9	11.7	11.7	8.6	8.6
EITHER PERCENT	129.0	297.0	52.0	129.0	129.0	297.0	52.0	129.0	23.0	83.0	56.0	56.0	71.0	71.0	51.0	51.0
	35.9	82.7	14.5	35.9	35.9	82.7	14.5	35.9	6.4	23.1	15.6	15.6	19.8	19.8	14.2	14.2









TEST 3 TO 4 COUNT OF PEOPLE IN THIS GROUP= 743

DB 500 1000 2000 3000 4000 6000 8000 10000 12000 14000 16000 18000 20000 22000 24000 26000 28000 30000 32000 34000 36000 38000 40000 42000 44000 46000 48000 50000 52000 54000 56000 58000 60000 62000 64000 66000 68000 70000 72000 74000 76000 78000 80000 82000 84000 86000 88000 90000 92000 94000 96000 98000 100000

LEFT EAR										RIGHT EAR										COMBINED EAR									
40	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
35	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
30	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
20	1	1	1	5	3	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	6	2	4	7	14	22	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	40	21	20	37	54	81	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	144	135	117	158	161	149	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	360	438	447	375	297	199	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743	743
-5	136	117	119	119	144	136	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-10	42	24	26	31	47	85	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-15	8	5	6	6	12	33	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-20	4	0	1	3	7	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-25	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-30	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-35	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-40	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

\*\*\*\*\* HEARING GOT BETTER \*\*\*\*\* HEARING GOT WORSE \*\*\*\*\*

CATEGORY NUMBER										CATEGORY NUMBER									
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
123.0	364.0	52.0	123.0	123.0	364.0	52.0	123.0	21.0	73.0	54.0	54.0	67.0	67.0	32.0	32.0	32.0	32.0	32.0	32.0
16.6	49.0	7.0	16.6	16.6	49.0	7.0	16.6	2.8	9.8	7.3	7.3	9.0	9.0	4.3	4.3	4.3	4.3	4.3	4.3
136.0	375.0	55.0	136.0	136.0	375.0	55.0	136.0	15.0	77.0	55.0	55.0	74.0	74.0	44.0	44.0	44.0	44.0	44.0	44.0
18.3	50.5	7.4	18.3	18.3	50.5	7.4	18.3	2.0	10.4	7.4	7.4	10.0	10.0	5.9	5.9	5.9	5.9	5.9	5.9
234.0	568.0	102.0	234.0	234.0	568.0	102.0	234.0	36.0	138.0	104.0	104.0	130.0	130.0	72.0	72.0	72.0	72.0	72.0	72.0
31.5	76.4	13.7	31.5	31.5	76.4	13.7	31.5	4.8	18.6	14.0	14.0	17.5	17.5	9.7	9.7	9.7	9.7	9.7	9.7



TEST 2 TO 3 COUNT OF PEOPLE IN THIS GROUP= 286

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DB 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS  
LEFT EAR RIGHT EAR COMBINED EAR  
\*\*\*\*\* HEARING GOT WORSE \*\*\*\*\*

40	0	0	2	2	1	1	0	0	0	0	1	1	0	0	0	0	2	0	1	0	0	0
35	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
30	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	1	0	0
25	0	0	0	0	4	3	0	0	0	0	0	1	2	0	0	0	0	0	1	0	2	0
20	1	2	0	2	3	8	0	0	0	0	1	0	4	9	0	0	0	0	0	0	4	0
15	3	1	1	4	3	13	0	0	3	2	3	7	5	13	0	0	3	1	0	0	5	4
10	12	11	15	20	28	42	0	0	11	9	10	17	23	44	0	0	4	7	6	10	11	28
5	42	56	55	51	57	41	0	0	63	43	43	42	55	49	0	0	29	23	34	35	54	58
0	145	150	158	137	129	70	286	286	133	169	173	153	121	76	286	286	202	220	205	199	173	286
-5	62	55	38	47	43	52	0	0	62	52	43	44	47	44	0	0	40	32	32	26	28	43
-10	17	9	13	16	11	32	0	0	9	8	9	13	17	24	0	0	5	3	6	8	9	19
-15	2	1	2	2	2	15	0	0	5	3	2	6	8	13	0	0	3	0	0	3	3	4
-20	1	0	2	3	2	4	0	0	0	0	1	1	3	5	0	0	0	0	1	1	0	5
-25	0	1	0	1	1	3	0	0	0	0	1	0	0	2	0	0	0	0	0	0	1	0
-30	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0
-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-40	1	0	0	1	1	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0

\*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

X	-0.6	0.1	0.5	0.3	1.3	0.5	0.0	0.0	-0.0	-0.2	0.0	-0.0	0.4	1.2	0.0	0.0	-0.2	0.0	0.2	0.2	0.8	0.7	0.0	0.0
S	5.6	4.8	5.8	7.2	7.6	10.1	0.0	0.0	4.9	4.3	4.8	6.6	7.3	10.0	0.0	0.0	3.7	3.0	4.8	5.4	5.6	7.4	0.0	0.0

CATEGORY NUMBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WORSE PERCENT	68.0	170.0	34.0	68.0	68.0	170.0	34.0	68.0	20.0	45.0	35.0	35.0	38.0	38.0	20.0	20.0
BETTER PERCENT	23.8	59.4	11.9	23.8	23.8	59.4	11.9	23.8	7.0	15.7	12.2	12.2	13.3	13.3	7.0	7.0
EITHER PERCENT	118.0	237.0	57.0	118.0	118.0	237.0	57.0	118.0	12.0	41.0	27.0	27.0	36.0	36.0	22.0	22.0

COMBINED EAR

[illegible]

\*\*\*\*\*  
HEARING GOT BETTER \*\*\*\*\*  
\*\*\*\*\*

[illegible][illegible]

CATEGORY NUMBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WORSE	76.0	182.0	47.0	76.0	76.0	182.0	47.0	76.0	26.0	57.0	49.0	49.0	51.0	51.0	33.0	33.0
PERCENT	26.6	63.6	16.4	26.6	26.6	63.6	16.4	26.6	9.1	19.9	17.1	17.1	17.8	17.8	11.5	11.5
BETTER	42.0	134.0	19.0	42.0	42.0	134.0	19.0	42.0	9.0	23.0	20.0	20.0	22.0	22.0	14.0	14.0
PERCENT	14.7	46.9	6.6	14.7	14.7	46.9	6.6	14.7	3.1	8.0	7.0	7.0	7.7	7.7	4.9	4.9
EITHER	109.0	237.0	62.0	109.0	109.0	237.0	62.0	109.0	34.0	76.0	65.0	65.0	69.0	69.0	44.0	44.0
PERCENT	38.1	82.9	21.7	38.1	38.1	82.9	21.7	38.1	11.9	26.6	22.7	22.7	24.1	24.1	15.4	15.4

TEST 1 TO 2

12345678910111213141516171819202122232425262728293031323334353637383940414243444546474849505152535455565758596061626364656667686970717273747576777879808182838485868788899091929394959697989910010110210310410510610710810911011111211311411511611711811912012112212312412512612712812913013113213313413513613713813914014114214314414514614714814915015115215315415515615715815916016116216316416516616716816917017117217317417517617717817918018118218318418518618718818919019119219319419519619719819920020120220320420520620720820921021121221321421521621721821922022122222322422522622722822923023123223323423523623723823924024124224324424524624724824925025125225325425525625725825926026126226326426526626726826927027127227327427527627727827928028128228328428528628728828929029129229329429529629729829930030130230330430530630730830931031131231331431531631731831932032132232332432532632732832933033133233333433533633733833934034134234334434534634734834935035135235335435535635735835936036136236336436536636736836937037137237337437537637737837938038138238338438538638738838939039139239339439539639739839940040140240340440540640740840941041141241341441541641741841942042142242342442542642742842943043143243343443543643743843944044144244344444544644744844945045145245345445545645745845946046146246346446546646746846947047147247347447547647747847948048148248348448548648748848949049149249349449549649749849950050150250350450550650750850951051151251351451551651751851952052152252352452552652752852953053153253353453553653753853954054154254354454554654754854955055155255355455555655755855956056156256356456556656756856957057157257357457557657757857958058158258358458558658758858959059159259359459559659759859960060160260360460560660760860961061161261361461561661761861962062162262362462562662762862963063163263363463563663763863964064164264364464564664764864965065165265365465565665765865966066166266366466566666766866967067167267367467567667767867968068168268368468568668768868969069169269369469569669769869970070170270370470570670770870971071171271371471571671771871972072172272372472572672772872973073173273373473573673773873974074174274374474574674774874975075175275375475575675775875976076176276376476576676776876977077177277377477577677777877978078178278378478578678778878979079179279379479579679779879980080180280380480580680780880981081181281381481581681781881982082182282382482582682782882983083183283383483583683783883984084184284384484584684784884985085185285385485585685785885986086186286386486586686786886987087187287387487587687787887988088188288388488588688788888989089189289389489589689789889990090190290390490590690790890991091191291391491591691791891992092192292392492592692792892993093193293393493593693793893994094194294394494594694794894995095195295395495595695795895996096196296396496596696796896997097197297397497597697797897998098198298398498598698798898999099199299399499599699799899910001001100210031004100510061007100810091010101110121013101410151016101710181019102010211022102310241025102610271028102910301031103210331034103510361037103810391040104110421043104410451046104710481049105010511052105310541055105610571058105910601061106210631064106510661067106810691070107110721073107410751076107710781079108010811082108310841085108610871088108910901091109210931094109510961097109810991100110111021103110411051106110711081109111011111112111311141115111611171118111911201121112211231124112511261127112811291130113111321133113411351136113711381139114011411142114311441145114611471148114911501151115211531154115511561157115811591160116111621163116411651166116711681169117011711172117311741175117611771178117911801181118211831184118511861187118811891190119111921193119411951196119711981199120012011202120312041205120612071208120912101211121212131214121512161217121812191220122112221223122412251226122712281229123012311232123312341235123612371238123912401241124212431244124512461247124812491250125112521253125412551256125712581259126012611262126312641265126612671268126912701271127212731274127512761277127812791280128112821283128412851286128712881289129012911292129312941295129612971298129913001

40 1 1

XXXXXXXXXXXXXXXXXXXX

300





TEST 3 TO 4 COUNT OF PEOPLE IN THIS GROUP= 689

LEFT EAR RIGHT EAR COMBINED EAR

DB 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS

HEARING GOT WORSE \*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

40	0	0	0	2	2	0	0	2	1	1	1	1	0	0	0	0	1	1	1	0	0
35	0	0	1	0	0	2	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0
30	1	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0
25	0	1	0	0	1	7	0	0	0	1	0	1	4	3	0	0	1	0	0	1	2
20	0	0	1	3	6	12	0	0	1	0	0	3	5	9	0	0	0	0	0	2	3
15	5	2	4	9	13	30	0	0	2	2	4	6	13	21	0	0	2	1	0	5	3
10	21	25	17	31	41	58	0	0	38	20	13	39	41	72	0	0	8	3	4	14	19
5	149	111	137	136	146	128	0	0	128	116	96	147	151	129	0	0	86	59	61	94	105
0	284	346	352	293	263	185	689	689	292	344	403	313	241	183	689	689	447	503	529	458	414
-5	171	163	148	154	155	144	0	0	166	161	139	137	148	157	0	0	115	104	81	95	114
-10	39	28	22	43	49	72	0	0	47	37	26	37	62	67	0	0	24	14	12	16	23
-15	12	10	5	9	7	29	0	0	10	4	5	3	15	25	0	0	2	4	1	4	4
-20	5	2	2	5	3	16	0	0	1	2	1	2	6	10	0	0	3	0	0	1	2
-25	1	1	0	3	1	0	0	0	1	0	1	0	2	5	0	0	0	0	0	0	2
-30	1	0	0	0	1	2	0	0	1	1	0	0	0	0	0	0	0	0	0	0	1
-35	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
-40	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

HEARING GOT WORSE \*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

X	-0.8	-0.7	-0.2	-0.3	0.2	-0.0	0.0	0.0	-0.5	-0.6	-0.5	0.3	-0.2	-0.1	0.0	0.0	-0.4	-0.5	-0.2	0.1	-0.0	0.0	0.0
S	5.6	4.9	4.7	6.4	6.7	9.2	0.0	0.0	5.9	5.1	4.5	5.5	7.0	8.9	0.0	0.0	4.2	3.4	3.2	4.3	4.8	6.5	0.0

HEARING GOT WORSE \*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

CATEGORY NUMBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WORSE	126.0	336.0	55.0	126.0	126.0	336.0	55.0	126.0	22.0	72.0	56.0	56.0	65.0	65.0	34.0	34.0
PERCENT	18.3	48.8	8.0	18.3	18.3	48.8	8.0	18.3	3.2	10.4	8.1	8.1	9.4	9.4	4.9	4.9
BETTER	125.0	369.0	53.0	125.0	125.0	369.0	53.0	125.0	16.0	77.0	54.0	54.0	72.0	72.0	49.0	49.0
PERCENT	18.1	53.6	7.7	18.1	18.1	53.6	7.7	18.1	2.3	11.2	7.8	7.8	10.4	10.4	7.1	7.1
EITHER	236.0	552.0	106.0	236.0	236.0	552.0	106.0	236.0	38.0	144.0	108.0	108.0	132.0	132.0	81.0	81.0
PERCENT	34.3	80.1	15.4	34.3	34.3	80.1	15.4	34.3	5.5	20.9	15.7	15.7	19.2	19.2	11.8	11.8







COMPARISON DATA ON TEST OF SHAW AFB SAMPLE DATA LASE 4 TEST'S LAST IN 93 OR 94

TEST 1 TO 2 COUNT OF PEOPLE IN THIS GROUP= 481

COMBINED EAR

RIGHT EAR

LEFT EAR

DB 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS

\*\*\*\*\* HEARING GOT WORSE \*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

40	0	0	0	1	3	4	0	0	0	0	0	2	1	6	0	0	0	0	0	0	0	0	0	1	1	0	0
35	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
30	0	0	0	1	1	2	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	1	2	1	0
25	1	1	0	3	2	5	0	0	0	0	0	1	0	3	1	6	0	0	0	0	0	0	0	0	1	2	0
20	1	1	2	2	3	8	0	0	0	0	0	2	1	2	0	4	6	0	0	0	0	1	0	0	1	3	4
15	2	2	5	6	13	23	0	0	0	0	0	4	1	4	6	11	23	0	0	0	2	1	1	4	3	14	0
10	26	24	23	34	50	43	0	0	0	0	0	27	16	18	22	51	52	0	0	0	6	6	8	15	28	38	0
5	82	75	63	94	87	73	0	0	0	0	0	92	87	77	97	98	63	0	0	0	76	49	43	67	84	62	0
0	230	278	283	217	176	106	481	481	222	273	280	236	189	132	481	481	305	378	363	313	265	184	481	481	481	481	481
-5	98	82	71	74	77	89	0	0	0	90	78	74	85	83	80	0	0	0	0	70	39	58	62	72	91	0	0
-10	29	9	26	37	53	60	0	0	0	30	18	20	23	28	65	0	0	0	0	17	4	7	16	16	58	0	0
-15	9	6	5	8	11	31	0	0	0	7	3	3	6	10	22	0	0	0	0	1	4	0	0	4	17	0	0
-20	1	2	3	3	2	19	0	0	0	4	3	1	1	1	14	0	0	0	0	2	0	0	0	1	4	0	0
-25	2	1	0	0	0	7	0	0	0	0	0	1	0	1	2	0	0	0	0	0	0	1	1	0	1	0	0
-30	0	0	0	0	0	5	0	0	0	0	0	1	0	2	4	0	0	0	0	0	0	0	0	1	2	0	0
-35	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0
-40	0	0	0	1	0	4	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0

\*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

X	-0.5	0.1	-0.2	0.3	0.5	-1.7	0.0	0.0	-0.2	-0.0	-0.1	0.4	0.8	-0.3	0.0	0.0	-0.2	0.1	-0.2	0.3	0.6	-0.7	0.0	0.0	0.0	0.0	0.0
S	5.6	4.9	5.1	6.8	8.2	11.6	0.0	0.0	6.2	4.7	5.0	6.0	7.1	11.0	0.0	0.0	4.3	3.0	3.2	4.6	5.8	8.2	0.0	0.0	0.0	0.0	0.0

\*\*\*\*\*

CATEGORY NUMBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WORSE PERCENT	121.0	290.0	58.0	121.0	121.0	290.0	58.0	121.0	25.0	74.0	60.0	60.0	67.0	67.0	44.0	44.0
BETTER PERCENT	25.2	60.3	12.1	25.2	25.2	60.3	12.1	25.2	5.2	15.4	12.5	12.5	13.9	13.9	9.1	9.1
EITHER PERCENT	150.0	300.0	71.0	150.0	150.0	300.0	71.0	150.0	16.0	97.0	74.0	74.0	88.0	88.0	53.0	53.0
	31.2	62.4	14.8	31.2	31.2	62.4	14.8	31.2	3.3	20.2	15.4	15.4	18.3	18.3	11.0	11.0
	240.0	419.0	121.0	240.0	240.0	419.0	121.0	240.0	41.0	156.0	126.0	126.0	143.0	143.0	91.0	91.0
	49.9	87.1	25.2	49.9	49.9	87.1	25.2	49.9	8.5	32.4	26.2	26.2	29.7	29.7	18.9	18.9

COMBINED EAR

T F L P F A R

F-

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## **Appendix G: Shift Results for Military and Civilian Groups**

<u>Page</u>	<u>Shift Result</u>
G-1	Test 1-2 Comparison - Military
G-2	Test 2-3 Comparison - Military
G-3	Test 3-4 Comparison - Military
G-4	Test 1-2 Comparison - Civilian
G-5	Test 2-3 Comparison - Civilian
G-6	Test 3-4 Comparison - Civilian

TEST 1 TO 2 COUNT OF PEOPLE IN THIS GROUP= 3029

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	LEFT EAR								RIGHT EAR								COMBINED EAR							
DB	500	1000	2000	3000	4000	6000	8000	1KRTS	500	1000	2000	3000	4000	6000	8000	1KRTS	500	1000	2000	3000	4000	6000	8000	1KRTS

\*\*\*\*\* HEARING GOT WORSE \*\*\*\*\*

40	2	2	4	8	7	14	0	0	0	0	0	2	4	8	0	0	0	0	0	0	0	1	2	4	0	0
35	4	0	1	1	1	4	0	0	2	0	2	1	2	3	0	0	1	1	1	1	1	1	0	2	0	0
30	1	2	1	3	6	17	0	0	5	1	0	1	3	20	0	0	0	1	1	1	1	1	3	4	0	0
25	8	4	3	6	11	39	0	0	7	2	2	7	8	31	0	0	5	0	1	2	4	19	0	0	0	
20	12	7	8	25	37	58	0	0	15	7	5	15	16	79	0	0	5	3	3	8	11	40	0	0	0	
15	38	15	17	44	92	156	0	0	50	16	27	39	62	142	0	0	24	7	8	20	25	80	0	0	0	
10	198	114	118	226	279	333	0	0	169	122	152	195	260	314	0	0	86	46	49	88	147	240	0	0	0	
5	581	574	501	648	605	590	0	0	573	583	503	600	608	523	0	0	424	349	336	504	533	525	0	0	0	
0	1314	1593	1728	1317	1188	738	3029	3029	1366	1638	1716	1467	1282	811	3029	3029	1914	2217	2276	1957	1789	1252	3029	3029	3029	
-5	593	569	489	533	531	509	0	0	564	510	502	496	501	525	0	0	434	348	307	366	393	526	0	0	0	
-10	186	108	124	159	168	299	0	0	208	118	96	165	214	331	0	0	101	46	41	69	95	192	0	0	0	
-15	62	31	27	40	66	129	0	0	44	24	17	28	46	128	0	0	23	8	4	12	17	92	0	0	0	
-20	18	7	6	10	25	87	0	0	16	3	6	11	14	69	0	0	9	3	2	0	3	40	0	0	0	
-25	8	1	2	7	7	22	0	0	8	3	0	2	4	20	0	0	3	0	0	0	6	7	0	0	0	
-30	2	1	0	0	1	14	0	0	2	2	0	0	4	15	0	0	0	0	0	0	1	3	0	0	0	
-35	0	0	0	2	1	10	0	0	0	0	1	0	0	5	0	0	0	0	0	0	0	3	0	0	0	
-40	2	1	0	0	4	10	0	0	0	0	0	0	1	5	0	0	0	0	0	0	0	0	0	0	0	

\*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

X	-0.1	-0.0	0.0	0.6	0.8	0.3	0.0	0.0	-0.0	0.1	0.3	0.4	0.5	0.2	0.0	0.0	-0.1	0.0	0.1	0.4	0.5	0.2	0.0	0.0	0.0
S	6.5	5.1	5.0	6.5	7.5	10.5	0.0	0.0	6.2	4.8	4.8	5.7	6.7	10.0	0.0	0.0	4.5	3.4	3.3	4.2	5.0	7.6	0.0	0.0	0.0

\*\*\*\*\*

CATEGORY NUMBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WORSE	770.0	1729.0	369.0	770.0	770.0	1729.0	369.0	770.0	153.0	500.0	382.0	382.0	456.0	283.0	283.0	283.0
PERCENT	25.4	57.1	12.2	25.4	25.4	57.1	12.2	25.4	5.1	16.5	12.6	12.6	15.1	9.3	9.3	9.3
BETTER	688.0	1597.0	321.0	688.0	688.0	1597.0	321.0	688.0	122.0	462.0	340.0	340.0	430.0	269.0	269.0	269.0
PERCENT	22.7	52.7	10.6	22.7	22.7	52.7	10.6	22.7	4.0	15.3	11.2	11.2	14.2	8.9	8.9	8.9
EITHER	1324.0	2560.0	661.0	1324.0	1324.0	2560.0	661.0	1324.0	274.0	900.0	692.0	692.0	834.0	533.0	533.0	533.0
PERCENT	43.7	84.5	21.8	43.7	43.7	84.5	21.8	43.7	9.0	29.7	22.8	22.8	27.5	17.6	17.6	17.6

TEST 2 TO 3 COUNT OF PEOPLE IN THIS GROUP= 3029

COMBINED EAR

RIGHT EAR

LEFT EAR

DB 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS

\*\*\*\*\* HEARING GOT WORSE \*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

40	2	1	1	2	4	2	0	0	1	1	1	2	6	0	0	0	0	0	1	1	1	1	0	0
35	1	1	0	1	4	5	0	0	0	1	0	1	2	4	0	0	0	0	0	0	0	0	1	0
30	3	0	2	3	9	10	0	0	1	1	2	2	6	15	0	0	0	1	1	2	3	4	3	0
25	4	1	1	4	9	27	0	0	4	1	3	4	9	22	0	0	0	5	1	0	1	4	11	0
20	17	9	9	22	25	67	0	0	7	7	5	10	27	45	0	0	0	1	2	3	1	11	23	0
15	39	21	25	47	81	135	0	0	29	13	23	45	62	128	0	0	0	15	5	3	13	37	56	0
10	168	101	132	218	263	349	0	0	142	117	102	179	284	329	0	0	0	69	40	47	96	139	235	0
5	606	552	580	713	635	540	0	0	602	526	513	642	661	544	0	0	0	410	349	360	510	525	554	0
0	1208	1642	1682	1295	1180	757	3029	3029	1409	1644	1771	1491	1252	855	3029	3029	0	1963	2225	2268	1996	1823	1302	3029
-5	658	568	471	524	533	538	0	0	598	577	483	499	512	537	0	0	0	446	357	298	347	381	482	0
-10	165	107	100	144	189	323	0	0	161	117	103	115	153	293	0	0	0	80	41	38	44	74	221	0
-15	51	11	11	30	54	152	0	0	48	21	16	29	33	141	0	0	0	27	5	4	12	24	83	0
-20	10	5	9	16	24	66	0	0	15	2	4	8	18	54	0	0	0	8	1	3	4	3	38	0
-25	8	6	2	4	6	23	0	0	9	0	2	1	2	27	0	0	0	1	0	2	0	3	8	0
-30	2	2	1	4	8	17	0	0	2	0	1	2	5	12	0	0	0	2	2	0	1	0	4	0
-35	2	1	1	0	0	8	0	0	0	1	0	0	1	7	0	0	0	1	0	0	0	0	3	0
-40	5	1	2	2	5	10	0	0	1	0	0	0	0	10	0	0	0	0	0	0	0	0	4	0

\*\*\*\*\* HEARING GOT BETTER \*\*\*\*\* HEARING GOT WORSE \*\*\*\*\*

X -0.2 -0.0 0.3 0.7 0.6 -0.2 0.0 0.0 -0.3 -0.1 0.1 0.6 1.0 -0.1 0.0 0.0 -0.2 -0.0 0.1 0.5 0.6 -0.1 0.0 0.0

S 6.4 4.9 5.0 6.2 7.4 10.0 0.0 0.0 5.8 4.7 4.6 5.5 6.6 9.7 0.0 0.0 4.3 3.3 3.3 4.0 4.9 7.2 0.0 0.0

\*\*\*\*\* HEARING GOT BETTER \*\*\*\*\* HEARING GOT WORSE \*\*\*\*\*

CATEGORY NUMBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WORSE	717.0	1723.0	307.0	717.0	717.0	1723.0	307.0	717.0	139.0	439.0	322.0	322.0	383.0	383.0	237.0	237.0
PERCENT	23.7	56.9	10.1	23.7	23.7	56.9	10.1	23.7	4.6	14.5	10.6	10.6	12.6	12.6	7.8	7.8
BETTER	685.0	1563.0	315.0	685.0	685.0	1563.0	315.0	685.0	85.0	443.0	325.0	325.0	411.0	411.0	277.0	277.0
PERCENT	22.6	51.6	10.4	22.6	22.6	51.6	10.4	22.6	2.8	14.6	10.7	10.7	13.6	13.6	9.1	9.1
EITHER	1268.0	2518.0	597.0	1268.0	1268.0	2518.0	597.0	1268.0	219.0	832.0	618.0	618.0	761.0	761.0	502.0	502.0
PERCENT	41.9	83.1	19.7	41.9	41.9	83.1	19.7	41.9	7.2	27.5	20.4	20.4	25.1	25.1	16.6	16.6

TEST 3 TO 4 COUNT OF PEOPLE IN THIS GROUP= 3029

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COMBINED EAR

RIGHT EAR

LEFT EAR

DB 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS

\*\*\*\*\* HEARING GOT WORSE \*\*\*\*\*

40	2	0	0	3	11	5	0	0	3	1	1	2	5	17	0	0	1	0	1	2	6	5	0	0
35	0	0	2	0	2	8	0	0	0	0	1	1	1	7	0	0	1	1	1	1	0	2	0	0
30	1	2	2	3	7	15	0	0	0	0	1	1	2	2	10	0	0	0	0	0	1	1	6	0
25	2	2	2	5	8	26	0	0	4	1	2	6	9	22	0	0	3	0	0	0	4	11	0	0
20	10	5	4	20	24	78	0	0	6	6	6	11	19	72	0	0	2	3	1	1	10	30	0	0
15	24	14	22	36	60	137	0	0	31	15	19	40	57	123	0	0	7	8	8	18	24	81	0	0
10	160	98	97	190	238	354	0	0	164	111	117	177	242	342	0	0	71	28	36	94	100	238	0	0
5	610	543	553	568	660	564	0	0	575	520	464	577	610	558	0	0	395	301	287	384	510	531	0	0
0	1332	1675	1672	1345	1150	799	3029	3029	1466	1696	1819	1480	1270	872	3029	3029	2056	2329	2352	2065	1862	1389	3029	3029
-5	655	565	539	625	577	530	0	0	599	557	480	551	561	536	0	0	401	315	298	387	405	496	0	0
-10	181	96	103	172	214	312	0	0	139	95	92	144	189	310	0	0	72	35	31	53	84	170	0	0
-15	31	20	19	30	44	117	0	0	28	13	13	18	41	93	0	0	11	7	10	14	12	46	0	0
-20	12	4	9	20	18	52	0	0	7	8	5	14	14	32	0	0	6	1	1	4	7	11	0	0
-25	5	4	2	5	5	14	0	0	4	2	5	3	6	18	0	0	2	1	2	4	2	8	0	0
-30	2	0	2	3	5	10	0	0	2	1	2	1	1	7	0	0	1	0	0	0	0	2	0	0
-35	0	0	0	2	1	4	0	0	0	1	1	0	1	3	0	0	0	0	0	1	1	1	0	0
-40	2	1	1	2	5	4	0	0	1	0	1	2	1	7	0	0	0	0	1	0	1	2	0	0

\*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

X	-0.2	-0.1	-0.0	-0.0	0.5	0.7	0.0	0.0	0.1	-0.0	0.1	0.3	0.5	0.8	0.0	0.0	-0.0	-0.0	-0.0	0.1	0.4	0.7	0.0	0.0
S	5.8	4.7	4.9	6.3	7.4	9.6	0.0	0.0	5.5	4.7	4.8	5.7	6.6	9.5	0.0	0.0	4.0	3.1	3.2	4.2	4.9	6.9	0.0	0.0

CATEGORY NUMBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WORSE	702.0	1675.0	328.0	702.0	702.0	1675.0	328.0	702.0	120.0	436.0	337.0	337.0	397.0	397.0	219.0	219.0
PERCENT	23.2	55.3	10.8	23.2	23.2	55.3	10.8	23.2	4.0	14.4	11.1	11.1	13.1	13.1	7.2	7.2
BETTER	553.0	1567.0	241.0	553.0	553.0	1567.0	241.0	553.0	85.0	333.0	248.0	248.0	307.0	307.0	195.0	195.0
PERCENT	18.3	51.7	8.0	18.3	18.3	51.7	8.0	18.3	2.8	11.0	8.2	8.2	10.1	10.1	6.4	6.4
EITHER	1134.0	2459.0	544.0	1134.0	1134.0	2459.0	544.0	1134.0	203.0	713.0	558.0	558.0	659.0	659.0	395.0	395.0
PERCENT	37.4	81.2	18.0	37.4	37.4	81.2	18.0	37.4	6.7	23.5	18.4	18.4	21.8	21.8	13.0	13.0

TEST 1 TO 2 COUNT OF PEOPLE IN THIS GROUP= 2859

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DB 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS

\*\*\*\*\* HEARING GOT WORSE \*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

	LEFT EAR	RIGHT EAR	COMBINED EAR
40	2 1 5 4 5 8 0 0 3 1 0 0 1 7 0 0 3 0 0 0 2 1 3 0 0		
35	1 1 1 1 4 6 0 0 0 0 0 2 3 5 0 0 0 0 0 1 0 0 3 0 0		
30	1 3 1 2 5 15 0 0 0 0 2 2 4 5 11 0 0 0 0 2 2 2 6 5 0 0		
25	3 2 5 8 11 22 0 0 0 2 3 2 6 12 25 0 0 0 4 2 3 1 5 10 0 0		
20	12 9 5 21 23 62 0 0 0 10 8 8 24 35 51 0 0 0 4 1 1 8 14 28 0 0		
15	51 22 33 62 96 157 0 0 0 44 18 30 62 85 151 0 0 0 15 11 11 34 33 64 0 0		
10	234 142 154 249 341 347 0 0 0 204 145 143 225 317 358 0 0 0 110 64 69 138 202 228 0 0		
5	732 684 639 738 675 559 0 0 0 660 645 584 713 691 584 0 0 0 537 432 404 550 622 612 0 0		
0	1070 1306 1327 1151 1005 744 2859 2859 1157 1272 1360 1132 1015 775 2859 2859 1710 1951 1986 1771 1557 1296 2859 2859		
-5	556 575 564 490 467 532 0 0 0 553 628 601 533 500 505 0 0 0 395 344 336 293 335 423 0 0		
-10	146 89 92 87 159 248 0 0 0 183 106 108 124 134 237 0 0 0 70 44 37 40 61 128 0 0		
-15	36 20 17 19 46 94 0 0 0 29 26 17 25 42 94 0 0 0 11 6 4 14 17 40 0 0		
-20	9 3 10 17 9 35 0 0 0 11 2 2 4 9 34 0 0 0 2 1 3 3 3 8 0 0		
-25	5 1 4 5 5 12 0 0 0 2 2 2 3 4 17 0 0 0 0 1 2 2 2 8 0 0		
-30	1 1 0 4 5 9 0 0 0 0 1 0 1 4 4 0 0 0 0 0 0 1 0 2 0 0		
-35	0 0 0 0 3 2 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 1 1 0 0		
-40	0 0 2 1 0 7 0 0 0 1 0 0 1 2 1 0 0 0 1 0 0 0 0 0 0		

\*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

X 0.7 0.5 0.5 1.3 1.5 1.1 0.0 0.0 0.4 0.2 0.2 1.1 1.5 1.3 0.0 0.0 0.4 0.3 0.3 1.0 1.2 1.1 0.0 0.0  
S 6.1 5.2 5.6 6.4 7.3 9.4 0.0 0.0 6.0 5.2 5.1 6.1 7.0 9.0 0.0 0.0 4.3 3.7 3.7 4.6 5.2 6.6 0.0 0.0

\*\*\*\*\*

CATEGORY NUMBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WORSE	799.0	1827.0	323.0	799.0	799.0	1827.0	323.0	799.0	194.0	493.0	348.0	348.0	425.0	425.0	256.0	256.0
PERCENT	27.9	63.9	11.3	27.9	27.9	63.9	11.3	27.9	6.8	17.2	12.2	12.2	14.9	14.9	9.0	9.0
BETTER	492.0	1302.0	190.0	492.0	492.0	1302.0	190.0	492.0	82.0	295.0	202.0	202.0	272.0	272.0	180.0	180.0
PERCENT	17.2	45.5	6.6	17.2	17.2	45.5	6.6	17.2	2.9	10.3	7.1	7.1	9.5	9.5	6.3	6.3
EITHER	1182.0	2430.0	496.0	1182.0	1182.0	2430.0	496.0	1182.0	273.0	749.0	528.0	528.0	668.0	668.0	423.0	423.0
PERCENT	41.3	85.0	17.3	41.3	41.3	85.0	17.3	41.3	9.5	26.2	18.5	18.5	23.4	23.4	14.8	14.8

TEST 2 TO 3 COUNT OF PEOPLE IN THIS GROUP= 2859

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DB 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS  
LEFT EAR RIGHT EAR COMBINED EAR  
\*\*\*\*\* HEARING GOT WORSE \*\*\*\*\*

40	3	2	3	6	4	12	0	0	4	3	3	4	5	12	0	0	0	0	0	0	1	2	2	5	0	0
35	3	2	0	2	5	5	0	0	1	1	1	0	0	3	0	0	0	0	0	0	1	1	1	2	4	0
30	0	3	2	1	5	7	0	0	2	2	1	1	8	7	0	0	0	0	0	3	5	3	2	2	1	0
25	1	1	3	5	16	24	0	0	4	3	11	9	7	26	0	0	0	0	0	1	0	0	4	5	8	0
20	9	9	7	15	30	52	0	0	7	10	5	17	33	68	0	0	0	0	0	6	2	3	6	14	27	0
15	36	14	22	43	87	135	0	0	32	18	36	60	71	151	0	0	0	0	0	20	10	11	26	32	59	0
10	215	138	144	222	349	318	0	0	196	135	196	220	302	375	0	0	0	0	0	67	58	71	104	161	246	0
5	679	778	661	705	701	539	0	0	735	697	674	664	721	575	0	0	0	0	0	565	498	451	528	667	572	0
0	1127	1304	1374	1139	963	731	2859	2859	1131	1360	1318	1215	988	730	2859	2859	0	0	0	1704	1942	1997	1767	1556	1228	2859
-5	549	503	501	544	461	543	0	0	568	509	489	467	483	479	0	0	0	0	0	406	295	267	346	327	475	0
-10	191	81	107	130	164	299	0	0	136	88	99	153	171	270	0	0	0	0	0	74	39	46	58	60	178	0
-15	32	14	21	24	42	119	0	0	31	22	20	35	39	106	0	0	0	0	0	8	5	3	7	19	32	0
-20	7	5	4	14	17	43	0	0	6	7	4	7	19	31	0	0	0	0	0	2	1	1	4	7	12	0
-25	4	3	3	5	4	19	0	0	1	2	2	4	6	9	0	0	0	0	0	0	3	3	3	2	3	0
-30	2	2	3	2	7	5	0	0	2	1	0	2	3	9	0	0	0	0	0	3	0	1	0	3	1	0
-35	1	0	1	1	3	1	0	0	0	0	0	1	2	3	0	0	0	0	0	0	0	0	1	0	4	0
-40	0	0	3	1	1	7	0	0	3	1	0	0	1	5	0	0	0	0	0	0	0	0	0	0	4	0

\*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

X 0.4 0.8 0.4 0.8 1.5 0.4 0.0 0.0 0.6 0.6 0.9 0.9 1.2 1.3 0.0 0.0 0.4 0.5 0.5 0.7 1.1 0.7 0.0 0.0  
S 6.1 5.2 5.5 6.3 7.5 9.5 0.0 0.0 6.0 5.3 5.5 6.3 7.2 9.4 0.0 0.0 4.3 3.8 3.8 4.6 5.2 6.9 0.0 0.0

\*\*\*\*\*

		CATEGORY NUMBER															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WORSE		762.0	1851.0	321.0	761.0	762.0	1851.0	321.0	761.0	164.0	466.0	341.0	341.0	413.0	413.0	237.0	237.0
PERCENT		26.7	64.7	11.2	26.6	26.7	64.7	11.2	26.6	5.7	16.3	11.9	11.9	14.4	14.4	8.3	8.3
BETTER		548.0	1429.0	211.0	548.0	548.0	1429.0	211.0	548.0	101.0	334.0	221.0	221.0	301.0	301.0	187.0	187.0
PERCENT		19.2	50.0	7.4	19.2	19.2	50.0	7.4	19.2	3.5	11.7	7.7	7.7	10.5	10.5	6.5	6.5
EITHER		1188.0	2464.0	508.0	1187.0	1188.0	2464.0	508.0	1187.0	257.0	745.0	534.0	534.0	672.0	672.0	404.0	404.0
PERCENT		41.6	86.2	17.8	41.5	41.6	86.2	17.8	41.5	9.0	26.1	18.7	18.7	23.5	23.5	14.1	14.1

TEST 3 TO 4 COUNT OF PEOPLE IN THIS GROUP= 2859

LEFT EAR RIGHT EAR COMBINED EAR  
DB 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS

40	1	1	2	3	3	10	0	0	1	2	1	1	2	10	0	0	0	1	0	0	2	4	0	0
35	1	0	0	1	0	0	0	0	2	0	1	0	2	3	0	0	0	1	0	0	0	4	0	0
30	4	4	2	2	3	10	0	0	4	3	0	5	6	9	0	0	0	0	0	0	2	1	4	0
25	1	0	3	5	7	19	0	0	2	4	5	2	4	24	0	0	0	3	1	4	1	4	6	0
20	8	5	7	10	17	51	0	0	13	5	11	22	29	60	0	0	0	4	4	2	9	4	22	0
15	26	14	25	35	54	108	0	0	22	14	19	36	59	106	0	0	0	15	9	9	12	20	55	0
10	135	67	94	152	211	276	0	0	106	72	102	164	235	243	0	0	0	50	23	38	84	109	154	0
5	485	417	477	575	503	492	0	0	467	378	458	545	555	443	0	0	0	306	217	274	369	413	433	0
0	1174	1350	1443	1170	1069	782	2859	2859	1222	1375	1427	1171	1000	763	2859	2859	0	1808	1984	2063	1770	1641	1239	2859
-5	767	822	644	663	653	548	0	0	764	810	637	639	621	545	0	0	0	571	547	407	512	523	607	0
-10	203	148	128	194	256	343	0	0	214	153	148	207	238	377	0	0	0	78	56	39	74	98	225	0
-15	40	19	21	29	51	132	0	0	22	24	30	39	59	169	0	0	0	13	11	15	16	33	72	0
-20	10	7	10	7	17	62	0	0	12	11	8	12	27	61	0	0	0	6	3	5	5	7	18	0
-25	1	1	1	6	6	10	0	0	2	3	4	10	10	18	0	0	0	4	2	0	4	1	8	0
-30	2	3	1	2	4	7	0	0	1	3	4	2	9	11	0	0	0	0	1	2	0	2	5	0
-35	0	0	0	2	3	4	0	0	0	0	1	0	0	6	0	0	0	0	0	1	0	0	2	0
-40	1	1	1	3	2	5	0	0	5	2	3	4	3	11	0	0	0	0	0	0	1	1	1	0

HEARING GOT WORSE \*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

X -0.8 -1.0 -0.4 -0.3 -0.4 -0.4 0.0 0.0 -0.9 -1.1 -0.6 -0.3 -0.2 -1.0 0.0 0.0 -0.6 -0.7 -0.3 -0.2 -0.2 -0.6 0.0 0.0

S 5.8 5.0 5.2 6.2 7.0 9.3 0.0 0.0 5.9 5.3 5.6 6.4 7.4 10.0 0.0 0.0 4.2 3.6 3.7 4.4 5.0 7.0 0.0 0.0

WORSER PERCENT 614.0 1447.0 289.0 614.0 614.0 1447.0 289.0 614.0 105.0 392.0 297.0 297.0 353.0 208.0 208.0

CATEGORY NUMBER															
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WORSER	614.0	1447.0	289.0	614.0	614.0	1447.0	289.0	614.0	105.0	392.0	297.0	297.0	353.0	208.0	208.0
PERCENT	21.5	50.6	10.1	21.5	21.5	50.6	10.1	21.5	3.7	13.7	10.4	10.4	12.3	7.3	7.3
BETTER	691.0	1807.0	292.0	690.0	691.0	1807.0	292.0	690.0	100.0	409.0	298.0	298.0	375.0	215.0	215.0
PERCENT	24.2	63.2	10.2	24.1	24.2	63.2	10.2	24.1	3.5	14.3	10.4	10.4	13.1	7.5	7.5
EITHER	1177.0	2449.0	545.0	1176.0	1177.0	2449.0	545.0	1176.0	201.0	739.0	559.0	559.0	674.0	402.0	402.0
PERCENT	41.2	85.7	19.1	41.1	41.2	85.7	19.1	41.1	7.0	25.8	19.6	19.6	23.6	14.1	14.1

## **Appendix H: Shift Results for Male and Female Groups**

<u>Page</u>	<u>Shift Result</u>
H-1	Test 1-2 Comparison - Male
H-2	Test 2-3 Comparison - Male
H-3	Test 3-4 Comparison - Male
H-4	Test 1-2 Comparison - Female
H-5	Test 2-3 Comparison - Female
H-6	Test 3-4 Comparison - Female





## TEST 2 TO 3 COUNT OF PEOPLE IN THIS GROUP= 6207

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	LEFT EAR										RIGHT EAR										COMBINED EAR									
DB	500	1000	2000	3000	4000	6000	8000	10000	1KRTS	500	1000	2000	3000	4000	6000	8000	10000	1KRTS	500	1000	2000	3000	4000	6000	8000	10000	1KRTS			

\*\*\*\*\* HEARING GOT WORSE \*\*\*\*\*

40	4	3	3	9	8	21	0	0	0	6	4	4	6	8	18	0	0	0	0	0	0	2	4	4	6	0	0	
35	3	3	0	3	9	11	0	0	0	1	2	2	1	3	7	0	0	0	0	0	1	1	1	2	6	0	0	
30	3	3	5	4	15	18	0	0	0	4	3	3	5	17	24	0	0	0	0	0	3	6	4	7	6	0	0	
25	7	1	4	12	26	59	0	0	0	9	6	15	14	20	53	0	0	0	0	0	6	1	0	4	11	23	0	0
20	26	19	16	42	59	130	0	0	0	16	20	16	31	59	110	0	0	0	0	0	7	6	8	7	24	54	0	0
15	72	39	52	101	174	296	0	0	0	60	32	59	107	144	285	0	0	0	0	0	35	17	17	40	71	118	0	0
10	395	246	283	472	645	691	0	0	0	352	253	308	422	628	720	0	0	0	0	0	140	95	117	216	328	503	0	0
5	1327	1372	1303	1491	1376	1124	0	0	0	1390	1255	1214	1385	1453	1161	0	0	0	0	0	1005	866	843	1112	1233	1162	0	0
0	2606	3149	3240	2551	2282	1579	6207	6207	0	2716	3201	3316	2824	2336	1695	6207	6207	0	0	0	3922	4420	4512	3939	3570	2662	6207	6207
-5	1278	1121	1009	1118	1052	1129	0	0	0	1218	1156	1001	1021	1046	1062	0	0	0	0	0	882	700	598	735	749	1024	0	0
-10	359	203	225	298	378	640	0	0	0	318	218	216	294	347	615	0	0	0	0	0	154	78	86	107	146	425	0	0
-15	83	23	36	54	106	291	0	0	0	76	42	39	70	83	266	0	0	0	0	0	36	10	9	20	44	128	0	0
-20	19	10	15	31	39	114	0	0	0	22	10	7	16	42	95	0	0	0	0	0	10	2	4	9	10	53	0	0
-25	12	9	4	10	13	50	0	0	0	11	2	4	5	9	41	0	0	0	0	0	1	3	5	3	6	14	0	0
-30	4	4	6	6	15	24	0	0	0	4	1	2	4	8	26	0	0	0	0	0	5	2	1	1	3	5	0	0
-35	4	1	2	1	3	9	0	0	0	0	1	1	1	3	12	0	0	0	0	0	1	0	0	1	0	9	0	0
-40	5	1	4	4	7	21	0	0	0	4	1	0	1	1	17	0	0	0	0	0	0	0	0	1	0	9	0	0

\*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

X	0.1	0.3	0.3	0.8	1.0	0.2	0.0	0.0	0.0	0.1	0.2	0.5	0.7	1.1	0.4	0.0	0.0	0.0	0.1	0.2	0.3	0.6	0.9	0.2	0.0	0.0
S	6.1	5.0	5.2	6.4	7.5	10.0	0.0	0.0	0.0	5.9	5.0	5.1	6.0	7.0	9.6	0.0	0.0	0.0	4.3	3.5	3.6	4.4	5.1	7.2	0.0	0.0

## CATEGORY NUMBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WORSE	1580.0	3772.0	676.0	1579.0	1580.0	3772.0	676.0	1579.0	318.0	967.0	707.0	707.0	849.0	849.0	504.0	504.0
PERCENT	25.5	60.8	10.9	25.4	25.5	60.8	10.9	25.4	5.1	15.6	11.4	11.4	13.7	13.7	8.1	8.1
BETTER	1339.0	3215.0	581.0	1339.0	1339.0	3215.0	581.0	1339.0	193.0	838.0	605.0	605.0	767.0	767.0	495.0	495.0
PERCENT	21.6	51.8	9.4	21.6	21.6	51.8	9.4	21.6	3.1	13.5	9.7	9.7	12.4	12.4	8.0	8.0
EITHER	2634.0	5270.0	1201.0	2633.0	2634.0	5270.0	1201.0	2633.0	498.0	1683.0	1247.0	1247.0	1530.0	1530.0	962.0	962.0
PERCENT	42.4	84.9	19.3	42.4	42.4	84.9	19.3	42.4	8.0	27.1	20.1	20.1	24.6	24.6	15.5	15.5

TEST 3 TO 4 COUNT OF PEOPLE IN THIS GROUP= 6207

AAAAAAAAAAAA

DB 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS

LEFT EAR RIGHT EAR COMBINED EAR

40	3	1	3	6	14	19	0	0	3	3	3	3	7	32	0	0	1	1	2	2	8	10	0	0
35	1	0	2	1	3	9	0	0	2	1	2	1	3	11	0	0	2	1	1	1	0	9	0	0
30	8	5	4	5	12	26	0	0	4	4	3	7	7	22	0	0	0	0	0	3	2	10	0	0
25	3	2	6	12	17	54	0	0	7	5	6	7	14	54	0	0	5	1	5	1	8	19	0	0
20	19	12	9	29	42	147	0	0	20	13	17	34	55	140	0	0	7	6	2	10	14	61	0	0
15	51	28	50	72	132	258	0	0	60	31	42	85	130	263	0	0	24	18	20	30	48	150	0	0
10	311	189	205	366	501	678	0	0	298	213	230	376	508	663	0	0	126	65	77	187	224	432	0	0
5	1165	1011	1114	1214	1239	1112	0	0	1126	986	984	1220	1240	1071	0	0	754	570	611	809	1015	1056	0	0
0	2681	3216	3297	2632	2304	1633	6207	6207	2849	3242	3438	2767	2376	1713	6207	6207	4100	4556	4654	4038	3672	2754	6207	6207
-5	1444	1431	1214	1342	1273	1123	0	0	1411	1388	1150	1232	1231	1120	0	0	994	869	724	926	943	1123	0	0
-10	409	248	235	397	485	693	0	0	344	246	252	367	450	676	0	0	149	91	70	149	198	398	0	0
-15	73	40	40	65	105	265	0	0	46	41	43	56	107	269	0	0	26	21	29	31	48	122	0	0
-20	25	15	19	33	44	120	0	0	19	20	14	30	43	90	0	0	13	4	6	9	16	30	0	0
-25	8	4	4	16	13	28	0	0	7	6	10	13	19	38	0	0	6	3	2	9	4	17	0	0
-30	4	3	3	8	10	22	0	0	4	5	7	4	10	19	0	0	0	1	2	0	2	8	0	0
-35	0	0	0	4	4	10	0	0	0	1	2	0	1	8	0	0	0	0	1	1	3	4	0	0
-40	2	2	2	5	9	10	0	0	7	2	4	5	6	18	0	0	0	0	1	1	2	4	0	0

\*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

X -0.4 -0.5 -0.1 -0.2 0.1 0.2 0.0 0.0 -0.3 -0.4 -0.2 0.1 0.2 0.3 0.0 0.0 -0.2 -0.3 -0.1 -0.0 0.1 0.3 0.0 0.0  
S 5.8 4.8 5.0 6.3 7.3 9.7 0.0 0.0 5.7 5.1 5.2 6.1 7.1 9.8 0.0 0.0 4.0 3.4 3.5 4.3 5.0 7.1 0.0 0.0

\*\*\*\*\* HEARING GOT WORSE \*\*\*\*\*

		CATEGORY NUMBER															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WORSE	1457.0	3407.0	688.0	1457.0	1457.0	3407.0	688.0	1457.0	1457.0	235.0	919.0	707.0	707.0	833.0	833.0	477.0	477.0
PERCENT	23.5	54.9	11.1	23.5	23.5	54.9	11.1	23.5	23.5	3.8	14.8	11.4	11.4	13.4	13.4	7.7	7.7
BETTER	1326.0	3539.0	579.0	1325.0	1326.0	3539.0	579.0	1325.0	1325.0	197.0	791.0	591.0	591.0	724.0	724.0	435.0	435.0
PERCENT	21.4	57.0	9.3	21.3	21.4	57.0	9.3	21.3	21.3	3.2	12.7	9.5	9.5	11.7	11.7	7.0	7.0
EITHER	2498.0	5209.0	1189.0	2497.0	2498.0	5209.0	1189.0	2497.0	2497.0	424.0	1568.0	1218.0	1218.0	1436.0	1436.0	862.0	862.0
PERCENT	40.2	83.9	19.2	40.2	40.2	83.9	19.2	40.2	40.2	6.8	25.3	19.6	19.6	23.1	23.1	13.9	13.9







## Appendix I: Shift Results for Ethnic Groups

<u>Page</u>	<u>Shift Result</u>
I-1	Test 1-2 Comparison - Whites
I-2	Test 2-3 Comparison - Whites
I-3	Test 3-4 Comparison - Whites
I-4	Test 1-2 Comparison - Hispanics
I-5	Test 2-3 Comparison - Hispanics
I-6	Test 3-4 Comparison - Hispanics
I-7	Test 1-2 Comparison - Blacks
I-8	Test 2-3 Comparison - Blacks
I-9	Test 3-4 Comparison - Blacks











TEST 2 TO 3 COUNT OF PEOPLE IN THIS GROUP= 2038

LEFT EAR

RIGHT EAR

COMBINED EAR

[illegible]

\*\*\*\*\* HEARING GOT WORSE \*\*\*\*\*

40 2 2 2 3 3 5 0 0 3 2 2 2 7 0 0 0 1 1 3 0 0

35 3 1 0 0 3 4 0 0 1 0 0 0 0 0 0 0 ; 0 0 0 1 0 0 0 1

30 T I Z I F C O O , ,

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	52
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	10	154	107	101	145	247	222	0	0	137	92	127	147	199	285	0	0	54	42	47	64	103	188	0	0
10	154	107	101	145	247	222	0	0	137	92	127	147	199	285	0	0	54	42	47	64	103	188	0	0	

5	503	563	473	502	522	392	0	0	525	515	494	483	530	415	0	0	402	367	316	371	483	419	0	0
5	503	563	473	502	522	392	0	0	525	515	494	483	530	415	0	0	402	367	316	371	483	419	0	0

0	786	920	985	824	667	533	2038	2038	808	951	938	857	702	574	2038	2038	1228	1300	1432	1230	1110	074	2038	2038
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y	0.5	0.8	0.4	0.7	1.5	0.4	0.0	0.0	0.6	0.5	0.8	1.1	1.4	0.0	0.4	0.5	0.4	0.5	1.0	0.8	0.0	0.0
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CATEGORY NUMBER

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WORSE	540.0	1310.0	217.0	539.0	540.0	1310.0	217.0	539.0	101.0	326.0	230.0	230.0	290.0	162.0	162.0
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[illegible][illegible]

PERCENT	40.7	86.2	16.8	40.7	86.2	16.8	40.7	25.2	17.6	17.6	22.6	13.2	13.2
ELDERLY	40.7	86.2	16.8	40.7	86.2	16.8	40.7	25.2	17.6	17.6	22.6	13.2	13.2

TEST 3 TO 4 COUNT OF PEOPLE IN THIS GROUP= 2038

DB 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS

COMBINED EAR																				
LEFT EAR								RIGHT EAR												
HEARING GOT WORSE *****																				
40	1	1	1	0	0	6	0	0	0	2	1	1	0	5	0	0	1	0	0	0
35	1	0	0	0	0	0	0	0	1	0	0	0	2	1	0	0	1	0	0	0
30	3	3	0	2	2	7	0	0	3	2	0	3	5	3	0	0	0	0	1	4
25	1	0	3	2	5	7	0	0	2	2	4	2	2	17	0	0	2	0	2	1
20	6	2	4	6	8	31	0	0	7	3	6	13	18	30	0	0	3	2	1	2
15	15	9	17	22	45	72	0	0	16	11	15	22	42	72	0	0	8	7	6	9
10	92	44	74	111	135	201	0	0	67	53	73	115	170	169	0	0	31	17	32	60
5	342	299	331	403	364	349	0	0	346	265	313	394	388	314	0	0	213	164	199	266
0	837	950	1014	843	763	579	2038	2038	857	970	1018	846	730	560	2038	2038	1309	1394	1441	1264
-5	548	602	479	478	469	393	0	0	566	595	471	452	450	392	0	0	399	403	310	368
-10	150	107	94	138	192	248	0	0	147	105	102	153	163	272	0	0	55	39	29	53
-15	33	14	12	19	28	84	0	0	12	18	19	24	40	124	0	0	9	7	14	9
-20	6	5	7	4	14	45	0	0	9	7	8	4	19	47	0	0	5	3	3	3
-25	0	0	1	4	5	6	0	0	0	2	3	5	5	11	0	0	3	0	0	2
-30	2	2	1	2	4	4	0	0	1	2	3	0	1	8	0	0	0	1	1	0
-35	0	0	0	1	2	3	0	0	0	0	0	0	0	6	0	0	0	0	0	0
-40	1	0	0	3	2	3	0	0	4	1	2	4	3	7	0	0	0	0	1	1
HEARING GOT BETTER *****																				

HEARING GOT BETTER *****															
X	-0.9	-1.1	-0.4	-0.4	-0.6	-0.5	0.0	0.0	-0.9	-1.1	-0.6	-0.3	-0.1	-1.4	0.0
S	5.9	4.9	5.1	6.0	6.8	9.0	0.0	0.0	5.8	5.2	5.5	6.3	7.2	9.6	0.0

CATEGORY NUMBER															
8 9 10 11 12 13 14 15 16															
WORSE	401.0	1008.0	168.0	401.0	401.0	1008.0	168.0	401.0	63.0	244.0	173.0	173.0	216.0	216.0	127.0
PERCENT	19.7	49.5	8.2	19.7	19.7	49.5	8.2	19.7	3.1	12.0	8.5	8.5	10.6	10.6	6.2
BETTER	486.0	1287.0	203.0	485.0	486.0	1287.0	203.0	485.0	68.0	287.0	209.0	209.0	265.0	265.0	144.0
PERCENT	23.8	63.2	10.0	23.8	23.8	63.2	10.0	23.8	3.3	14.1	10.3	10.3	13.0	13.0	7.1
EITHER	808.0	1733.0	352.0	807.0	808.0	1733.0	352.0	807.0	128.0	491.0	362.0	362.0	447.0	447.0	259.0
PERCENT	39.6	85.0	17.3	39.6	39.6	85.0	17.3	39.6	6.3	24.1	17.8	17.8	21.9	21.9	12.7

TEST 1 TO 2 COUNT OF PEOPLE IN THIS GROUP= 506

AAAAAAAAAAAA

DB 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS COMBINED EAR

RIGHT EAR

LEFT EAR

\*\*\*\*\* HEARING GOT WORSE \*\*\*\*\*

40	0	2	3	2	3	1	0	0	0	0	0	1	1	2	0	0	0	0	1	1	2	0	0
35	1	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0
30	0	0	0	0	0	3	0	0	2	2	0	0	1	2	0	0	0	0	1	2	1	2	0
25	1	0	0	1	0	2	0	0	1	0	0	1	2	7	0	0	2	1	0	0	0	0	0
20	3	2	1	2	5	12	0	0	2	4	0	2	4	14	0	0	1	0	0	0	3	0	0
15	2	1	4	6	15	19	0	0	10	2	4	6	8	19	0	0	3	1	1	4	3	10	0
10	28	23	10	33	44	66	0	0	29	25	33	28	40	57	0	0	9	6	8	16	22	37	0
5	109	109	81	110	104	77	0	0	110	100	91	106	108	92	0	0	75	74	49	79	98	111	0
0	214	239	280	219	205	138	506	506	212	250	243	227	213	137	506	506	325	346	370	328	300	195	506
-5	94	97	102	95	96	86	0	0	100	102	111	101	91	89	0	0	67	61	63	59	61	97	0
-10	36	22	12	31	21	63	0	0	33	13	19	27	29	44	0	0	15	13	11	16	14	34	0
-15	11	6	9	5	7	21	0	0	4	6	4	6	8	24	0	0	5	0	0	2	1	11	0
-20	3	4	3	0	5	7	0	0	3	1	0	1	1	12	0	0	4	2	1	0	0	1	0
-25	2	0	1	2	0	4	0	0	0	1	0	0	0	6	0	0	0	0	0	0	1	4	0
-30	0	0	0	0	1	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
-35	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
-40	2	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

\*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

X	-0.4	-0.0	-0.3	0.4	0.9	-0.1	0.0	0.0	0.3	0.3	0.1	0.2	0.7	0.5	0.0	0.0	-0.1	0.1	-0.0	0.4	0.8	0.1	0.0	0.0
S	6.8	6.0	5.7	6.3	7.1	10.0	0.0	0.0	6.1	5.5	5.1	5.8	6.4	9.8	0.0	0.0	4.7	4.2	4.1	4.5	5.1	7.1	0.0	0.0

CATEGORY NUMBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WORSE PERCENT	110.0	278.0	58.0	110.0	110.0	278.0	58.0	110.0	22.0	70.0	59.0	59.0	66.0	66.0	36.0	36.0
BETTER PERCENT	21.7	54.9	11.5	21.7	21.7	54.9	11.5	21.7	4.3	13.8	11.7	11.7	13.0	13.0	7.1	7.1
EITHER PERCENT	109.0	265.0	45.0	109.0	109.0	265.0	45.0	109.0	20.0	66.0	50.0	50.0	64.0	64.0	40.0	40.0
	21.5	52.4	8.9	21.5	21.5	52.4	8.9	21.5	4.0	13.0	9.9	9.9	12.6	12.6	7.9	7.9
	203.0	414.0	98.0	203.0	203.0	414.0	98.0	203.0	42.0	128.0	104.0	104.0	123.0	123.0	71.0	71.0
	40.1	81.8	19.4	40.1	40.1	81.8	19.4	40.1	8.3	25.3	20.6	20.6	24.3	24.3	14.0	14.0



COMPARISON DATA ON TEST OF BLACKS AT EIGHT AFB'S - 4 TESTS LAST IN 93 OR 94

TEST 3 TO 4 COUNT OF PEOPLE IN THIS GROUP= 506

DB 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS 500 1000 2000 3000 4000 6000 8000 1KRTS  
 LEFT EAR RIGHT EAR COMBINED EAR  
 \*\*\*\*\*  
 \*\*\*\*\* HEARING GOT WORSE \*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

40	1	0	0	1	1	1	0	0	2	1	1	1	1	3	0	0	1	0	1	1	1	1	0	0		
35	0	0	2	0	0	1	0	0	0	0	1	0	0	2	0	0	1	1	1	0	0	1	0	0		
30	1	0	2	0	0	1	0	0	0	1	0	0	0	4	0	0	0	0	0	0	0	1	0	0		
25	0	2	0	0	1	5	0	0	0	0	0	0	0	3	0	0	1	0	1	0	0	1	0	0		
20	1	3	0	3	3	14	0	0	3	0	1	3	7	16	0	0	0	2	0	1	2	3	0	0		
15	3	2	1	3	9	21	0	0	9	4	3	9	7	13	0	0	2	0	1	2	3	13	0	0		
10	20	15	12	23	40	43	0	0	15	14	11	23	33	49	0	0	11	9	2	11	10	38	0	0		
5	82	83	77	105	93	80	0	0	92	72	85	99	98	83	0	0	44	39	43	56	72	68	0	0		
0	224	273	287	221	197	133	506	506	228	266	275	234	193	159	506	506	330	376	397	353	311	231	506	506		
-5	119	105	108	109	104	103	0	0	106	120	102	96	115	88	0	0	93	69	51	68	83	111	0	0		
-10	45	16	11	32	41	63	0	0	42	23	21	30	38	50	0	0	18	10	5	11	16	27	0	0		
-15	6	5	3	6	12	28	0	0	6	2	3	6	7	24	0	0	4	0	3	0	4	7	0	0		
-20	3	2	3	1	3	9	0	0	0	3	2	4	3	7	0	0	1	0	0	2	4	2	0	0		
-25	0	0	0	1	0	2	0	0	2	0	0	1	2	2	0	0	0	0	0	1	0	1	0	0		
-30	0	0	0	0	0	2	0	0	1	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0		
-35	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0		
-40	1	0	0	0	1	0	0	0	0	0	1	0	0	2	0	0	0	0	0	0	0	1	0	0		
***** HEARING GOT BETTER *****																										

\*\*\*\*\* HEARING GOT BETTER \*\*\*\*\*

X -1.0 -0.2 -0.2 -0.3 -0.2 -0.4 0.0 0.0 -0.5 -0.6 -0.3 -0.0 -0.2 0.4 0.0 0.0 -0.5 -0.2 -0.1 -0.1 -0.3 0.1 0.0 0.0  
 S 6.1 5.0 5.1 6.0 7.1 9.5 0.0 0.0 6.4 5.1 5.4 6.1 6.9 10.0 0.0 0.0 4.7 3.6 4.1 4.3 4.9 6.9 0.0 0.0

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		CATEGORY NUMBER															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
WORSE PERCENT		107.0	251.0	55.0	107.0	107.0	251.0	55.0	107.0	17.0	71.0	55.0	55.0	66.0	66.0	37.0	37.0
		21.1	49.6	10.9	21.1	21.1	49.6	10.9	21.1	3.4	14.0	10.9	10.9	13.0	13.0	7.3	7.3
BETTER PERCENT		111.0	299.0	40.0	111.0	111.0	299.0	40.0	111.0	17.0	62.0	42.0	42.0	55.0	55.0	38.0	38.0
		21.9	59.1	7.9	21.9	21.9	59.1	7.9	21.9	3.4	12.3	8.3	8.3	10.9	10.9	7.5	7.5
EITHER PERCENT		198.0	416.0	90.0	198.0	198.0	416.0	90.0	198.0	34.0	123.0	92.0	92.0	112.0	112.0	72.0	72.0
		39.1	82.2	17.8	39.1	39.1	82.2	17.8	39.1	6.7	24.3	18.2	18.2	22.1	22.1	14.2	14.2